




THE  
**MANVALL**  
of the Anatomy or dissection  
of the body of Man.

*Which usually are shewed in the publick  
Anatomicall exercises.*

*Methodically digested into 6 Books  
By Alexander Read. D. of Physick.*

London

*Printed for Rich. Thral and are to be sold  
at his shop at the signe of the*  *in Cheap side.*

*R.D. Graham*

1527.

*The Manuall*  
OF THE  
**ANATOMY**  
OR  
**DISSECTION**  
Of the Body of  
**MAN.**

Containing the enumeration and  
description of the parts of the same ;  
which usually are shewn in the publick  
Anatomicall Exercises.

With sundr ; Figures thereunto belonging.

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The fourth Edition.

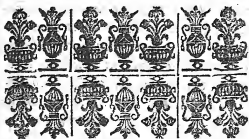
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By **ALEXANDER READ,**

*Doctor of Physick ; a fellow of the Physicians Colledg of London ; and a Brother of the Worshipfull Company of the*  
**BARBER-CHIRURGIANS.**

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LONDON, Printed by *T. Newcomb*, for  
*Richard Thrale*, at the sign of the  
Cross-Keys, at Pauls-Gate, 1650.



**C A R O L O**  
**Magnæ Britanniaë**  
**Monarchæ Hiberniaëq;**  
 ac Galliaë Regi poten-  
 tissimo fausta omnia  
 precor.



*N* offero Majestati  
 vestrae lucubratiun-  
 culas istas Anato-  
 micas : Munus fa-  
 teor te minimè dig-  
 num, quem Deus ad  
 supremum ferè honoris in terris  
 culmen

## Epistola Dedicatoria.

culmen exexit. Nihilominus si omnia iusto trutinæ examine pensentur, quivis æquus arbiter pronuntiabit eas ad te properare debere. Cogitaverat pridem apud se Maestas vestra quàm utile, imo necessarium huic Reipublicæ sit multos habere peritos Chirurgos, siæ Pax alma floreat, siæ Bellum ingruat. Quapropter ea sanxit, ut doctus aliquis ac peritus Medicus communionis huius fratribus ex suggestu, singulis diebus Martis, huic exercitio destinatis, præcepta artis traderet ab auditoribus excipienda, atque Anatomicis dissectionibus temporibus constitutis præset. Quum ea munia mihi obeunda ante aliquot annos commissa fuissent, animadverti illorum in rebus Anatomicis præfectum mirè tardatum, quod nullum haberent compendium Anatomicum, lingua vulgari emissum. Ut huic desiderio occurrerem, compendiolum tale in

cem



## Epistola Dedicatoria.

cem emisi, ex cujus lectione tyrones fructum aliquem percipere. Verum quum proficientibus visum fuisset nimis jejunum, sumpsi id iterum in manus, ac copiosius de humani corporis partibus disserui. Quum itaque secunda cura refectum in lucem emittendum sit, ad quem potius, quam ad vestram Majestatem tendet, qua prima fecura autrix fuit? Nec est quod verear me audacis, aut inverecundia crimen incursum: Quum mihi securitatem promittat eximia vestra comitas atque affabilitas erga omnes, quae omnium amorem conciliant, ut dignitas regia timorem. Quae duo Sceptra Regibus firmant. Vnum hoc Opella huic ex hac Dedicatione promittere possum: Eam gratiorem omnibus futuram, quod tanti ac talis Regis nomen sibi praescripserit. Scribebam Londini 4. Calend. Octob. Anni

A 3

ab

Epistola Dedicatoria.

---

*ab exhibito in carne Messiah,  
supra millesimum sexcentessimum  
tricesimi septimi.*

Vestræ Majestatis  
cultor humillimus,

ALEXANDER REIDUS  
*Scoto-Britannus.*


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To

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## To the READER.

Courteous Reader,

 *Now I present to Thee the third Edition of the Manual of Anatomy, which shall be the last that shall be published in my lifetime, which is not far from its period. The Hour-glass hasteneth, and but few sands remain unrun. The book of the Brest, and the book of the Brain are altogether new, as the book also of the Bones. In this Edition all things are set down more fully, Methodically, and Correctly, than in the former. If it give thee contentment, and further thy proceedings, I have obtained that which I aimed at: for I expected no other reward of my labour. I have endeavoured to set down all things as*

## TO the READER.

temperating my self as plainly and shortly as I could, to the capacity of those, who begin to addict their minds to this study. I am not so in love with my own labours, as to think that they can profit such as have made a reasonable progress in it. However, it will serve any one in stead of an Index, to present briefly unto the minde those things which they may finde set down at large, in the ample discourses of learned Anatomists, as well Ancient as Modern. Make then of it what use thou shalt think fittest, ad wish well to the Author, who hath endeavoured to ease thee of some pains, which thou must have taken to have contrived such a compend as this is, of the description of the parts of the body of Man.

Vale.

THE



The explication of the  
first figure.

- 1 The hairy Scalp. 2 The Fore-  
head. 3 The Ear. 4 The Eyes.  
5 The Nose. 6 The Mouth. 7 The  
Chin. 8 The Temple. 9 The  
Cheek. 10 The Arm. 11. The  
Hand. 12 The Brest. 13 The Sides.  
14 The Belly. 15 The Genitals.  
16 The Thighs. 17 The Knees.  
18 The Legs. 19 The Feet.

The explication of the  
second figure.

- 1 The back part of the Head.  
2 The Shoulder. 3 The Elbow. 4  
The Back. 5 The Buttock. 6 The  
Hams. 7 The Calves of the Legs.  
8 The Ankles. 9 The Insteps. 10  
The Heel.

These two figures are to be placed  
between the Epistle to the Rea-  
der and the first Chapter.



## The Number and Contents of the BOOKS.

**T**He first Book containeth the description of the parts of the belly, and hath 27 Chapters.

The second Book containeth the description of the parts of the breast, and hath 12 Chapters.

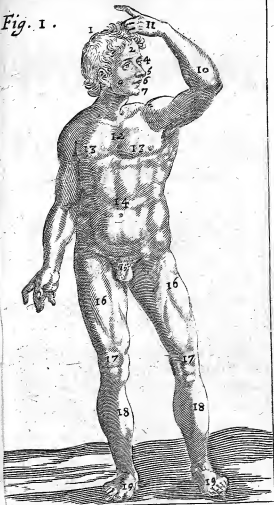
The third Book describeth the head, and hath 26 Chapters.

The fourth setteth down the veins, arteries, and sinews of the limbs, and hath 7 Chapters.

The fifth Book describeth the muscles of the whole body, and hath 31 Chapters.

The sixth setteth down the bones, and hath 28 Chapters.

*Fig. I.*





THE  
**FIRST BOOK**  
 of the lower Cavity,  
 Called  
**ABDOMEN.**

CAP. I.

*Of the division of the parts of the  
 Body of Man in general.*



Natomy is an artificial separation of the parts of the body by section, practised to attain to the knowledge of the frame of it, and the use of each part. In anatomical exercises, first the whole carcass doth offer it self, then the parts.

The description of Anatomy.

The



The Regions of the whole

What the whole and a part signify.

Things required in a part being strictly taken.

1.

2.

3.

4.

5.

6.

The whole hath four Regions, to wit, the fore and back parts, and the lateral, which are the right and left.

I call the whole that which containeth the parts, and a part that which is contained in the whole, according to the most ample acception of the term part; for in a more strict acceptation a part is a body solid, cohering with the whole, endued with life, and framed to perform some function.

A part then must be solid: the humors then cannot be numbred amongst the parts, because they are fluid.

Secondly, it must have life: and so the extremities of hairs and nails are not to be accounted parts.

Thirdly, one part must not nourish another: and so the blood, fat, and spirits are not parts.

Fourthly, it must have a circumscription.

Fifthly, it must be united with the whole.

Sixthly, it must have some action and use.

The.

The principal differences of parts are taken either from their nature or functions. From their nature, parts are said to be either similiary or dissimiliary.

A similiary part is that whose particles are of the same substance and denomination with the whole : as every portion of a bone is a bone. It is otherwise called a simple part.

Of simple parts there are ten in number, to wit, The skin, a membrane, the flesh, a fiber, a vein, an artery, a nerve, a ligament, a cartilage, a bone : they are comprehended in these two verses.

*Cartilago, caro, membrana, arteria, nervus,*

*Vena, ligamentum, cutis, os, lentissima fibra.*

To these a tendon, which is the principal part of a muscle, may be added ; for the substance of it, it is simple, without any composition.

The differences of the parts.

What a similiary part is.

The number of simple parts.

Of a tendon.

Of

The differences of simple parts.

Of the former simple parts, some are simple indeed, and these are in number seven; the skin, a membrane, the flesh, a fibre, a cartilage, a bone. The rest are onely simple to the eye or sense, and not to reason; for a nerve (for example) is composed of many filaments, covered with a membrane.

What a dissimilary part is.

A dissimilary part is that whose portions are neither of the same substance, nor the same denomination; as a muscle, in the which are flesh, a nerve, and a tendon. It is otherwise called a compound part, and an organical part.

Things to be observed in an organical part.

In an organical part foure particles are found; First, the chiefe particle, as the christallin humour in the eye.

Secondly, that particle, without the which the action cannot be performed, as the optick nerve.

Thirdly, that which furthereth the action, as are the membranes and muscles.

Fourthly, that by the which the

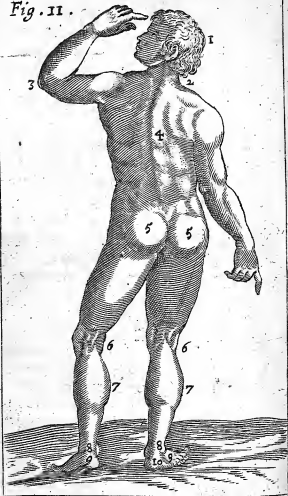
1.

2.

3.

4.

Fig. II.



the action is preserved, as the eyelids.

Of organick parts there are four degrees.

The first is made onely of the similars, as a muscle.

The second receiveth the first kind of organick parts, and other similaries, as a finger.

The third admitteth those of the second degree, as the hand.

The fourth is made of the third and other parts, as the arme.

Parts from their function are said to be either sustaining or sustained. The bones sustaine the frame of the whole body, the rest are sustained. now these are the cavities or the limbs.

The degrees of an organick part.

1.

2.

3.

4.

The differences of parts taken from their function.

CAP. II.

Of the circumscription, regions, substance, and parts of the Abdomen.

OF all the parts of the body which are sustained, we are to

to begin dissection with the cavities: First because they offer themselves to the view in the fore region of the body.

Secondly, because they being moist, and apt to receive the impression of the externall heat, soonest putrifie, and send out noisome smels. The cavities are appointed to receive the principall parts, and those which minister unto them. Wherefore there are three cavities, according to the number of the principall parts. The head is for the brain, the breast is for the heart, and the belly for the liver. And because this cavity is most subject to putrefaction, you are to begin at it. Now foure things concerning it offer themselves. First, the circumscription, or bounding of it. Secondly, the regions of it. Thirdly, the substance of it. Fourthly, the speciall parts of it.

As concerning the circumscription of it, it is severed from the breast by the midriff. It is bounded  
above

above by the *cartilago ensiformis*, and beneath by the share bones.

The regions of it are three, the uppermost, middlemost, and lowermost. The uppermost, which is bounded between the *mucronata cartilago*, and three inches above the navell, about the ending of the short ribs, hath three parts: The laterall, which are called *hypochondria*, or *subcartilaginea*, because they lie under the cartilages of the short ribs. In the right *hypocentrum* lieth the greatest part of the liver, but in the left the spleen, and greatest part of the stomach. The third part is that which before lieth between the two laterall parts, and is properly called *epigastrium*, because the stomach lieth under it. In this part remarkable is the pit of the breast, which is called *regia*, or *scrobiculus cordis*, by the moderne Writers. The middlemost part extendeth it selfe from three inches above the navel, to three inches under it. The fore part is where the navell is, from whence

whence it is called *regio umbilicalis*. The two laterall parts have no proper denominations. In the right are contained *intestinum cæcum*, with part of *Colon*. In the left part of it, a portion of *Iejunum*, and the rest of *Colon*. The rest of *Iejunum* is under the navell. The navell in man is wrinkled, as the forehead of an aged woman; but in other creatures it is onely a hard knot without hairs, having no wrinkle. It hath no laterall parts, having no proper names; although *Laurentius lib. 6. Histor. Anatom.* affirmeth it to have, and gives them names; in this region is contained the whole hungry gut.

3.  
The  
lower  
region.

The lower region is called *ὑποχονδρια*: This region hath three parts, the laterall, and the middlemost: The laterall, which reach to the *hypochondria*, are called *ακρωτες*, because they are the seat of lust, which is called *λασχεια*. By *Hippocrates* they are termed *πνευμονες*, because they being placed between the hanch-bones, and ribs,  
are



are lank, & seem to contain nothing. In Latine they are called *Ilia*, because the *Ilium intestinum* lieth under them on every side. Besides this in the right part are placed portions of the *Colon*, & *cæcum intestinum*, which are tyed together. In the left part are contained a great part of the *Colon*, and the *intestinum rectum*.

*Ilia.*

The fore part of the *hypogastrium* by *Aristot. lib. 1. Hist. animal. 3.* is called *Uterus* which *Gaza* calleth *Abdomen* and *Sumen*. Under it lieth the *pubes*, which word signifieth both the haire, and the place where the haire grow, which appeare to bud in girles the twelfth yeare, but in boyes the fourteenth yeare, when way is made for the monethly courses and seed, the skin being there made thinner, the heat encreasing in them. At the sides of the *pubes* appeare *puberes*, or *inguina*, the groines. Under this middle region are contained the bladder, the *intestinum rectum*, and the matrix in women.

*Inguina.*

The

The hindermost parts.

The hindermost parts are called *lumbi*, the loines, and they reach from the bending of the back to the buttocks, called *nates*, *ab innitendo*, because when we sit, we rest upon them. The fleshy part on each side is called *πλάξ*, *παρὰ τὸ παῦσαι*, *à palpando*, from culling or clapping. In the right loynes, the right kidney; but in the left, the left kidney is contained.

### CAP. III.

*Of the common containing parts of the belly.*

THE common containing parts of the belly are foure, the skarf-skin, the skin, the fat, and the *membrana carnosæ*.

The skin in man is called *cutis*, but in beasts *aluta*; in Greek it is called *δέρμα*, and *δέρμα*; either *παρὰ τὸ δέσασθαι*, because it is easily shed off; or from *τέρμα*, seing it is the end and superficies of the whole body: Of all the membranes of

the body it is the thickest.

It hath a double substance; the  
 e is externall, called *ἐπίδερμις* ὅτι  
 ἐπὶ δέρματι δέχεται because it is placed  
 on the skin as a cover, but is  
 termed *cuticula* in Latin; for it is  
 as large as the skin, and more com-  
 pact; for watrish sharp humours,  
 passing through the skin, are stayed  
 by the thickness of this, and so pu-  
 pules are caused. In man it is as the  
 peelings of onions. It is without  
 blood, and without feeling.

Three causes concur to the ge-  
 neration of it; to wit, the materi-  
 all cause is a viscous and oleous va-  
 pour of the blood. The internall  
 efficient cause, the naturall heat of  
 the subjacent parts raising it up.  
 The externall efficient cause is the  
 externall coldnesse, partly of the  
 aire, partly of the skin it self: It is  
 engendered even as the thin skin in  
 milk, and fat brothe; It is hardly  
 separate from the skin with a knife;  
 but easily in living creatures by  
 a vesicatory, and in dead persons  
 by

*cuticula:*

by fire, or scalding hot water.

First, the use of it is to defend the skin, which is of an exquisite sense, from externall immoderate, either heat or cold. In cold weather it breaketh the cold, that the perspiration should not be altogether hindered: In hot weather by its compactnesse it hindereth too great perspiration.

Secondly, to be a middle between the skin, and the object of feeling.

Thirdly, to stay the ichorous substance from issuing from the veines and arteries; for this we see when the *cuticula* is rubbed off by any meanes.

2 The true skin is six times thicker than the skarfe skin: in children, women, and those which are borne in hot countreyes, it is thinner; but in men, and in those who inhabit cold countreyes, it is thicker.

The Negroes become black, because they having a softer skin, and large pores and loose, many vapours

ours of the adust humours, which are raised with the sweat; the grosser substance whereof, by reason of the excessive heat, being dried and burned, caused the blackness of the skin; for their infants are not borne black, but reddish; and they afterwards become black, the *cuticula* growing in them as in us.

The skin in the forehead and sides it is thin, thinner yet in the palme of the hand, but thinnest of all in the lips and cuds. In the head, back, and under the heel it is thickest. Under the heel the *cuticula* in some will be as thick as a barley corne.

The pores will appeare in the skin in the winter time, it being bared; for where they are, the *cuticula* will appeare as a Gooses skin.

The skin hath an action, to wit, the sense of feeling.

*Pinguedo*, πικνέλη, est humor oleosus nostri corporis à calore moderato subiectarum illi partium elevatus, ac inter membranam carnosam ac cutem

3. Of fat

Its kinds

*cutem concrefcere, quæ partes sunt denfiores ac frigidiores. Ejus dua sunt fpecies, axungia, πνιδν, & ſæ-  
vum, five ſtop.*

They differ ; for firſt, *axungia* is in beaſts not horned, which are full toothed; but *ſævum* in beaſts not horned, which are not full toothed.

Secondly *axungia* is eaſily melted, but not ſo eaſily congealed; but *ſævum* is not eaſily melted, but is eaſily congealed.

Thirdly, greaſe is not brittle, but tallow is. The fat under the ſkin is greaſe; but in the caule, kidneies, the heart, the eyes, and about the joynts, it is tallow.

The uſes of it are theſe : Firſt, it defendeth the body from the aire; ſo Apothecaries, when they mean to preſerve jucyes, they poure oile upon them.

Secondly, it preſerveth the naturall heat.

Thirdly, it furthereth beauty by filling up the wrinkles of the ſkin.

Fourthly,

Fourthly, in the Muscles it filleth up the empty places, it is under the Vessels that they may passe safely; in the Intrals it helpeth concoction, in the Buttocks it is as down in a pillow.

*Membrana carnosa*, or *Uterus sup-nodns*, so called in Man, not that it is in him fleshy, but nervous, and so *Nervea*; but because in Beasts, which the Ancients used most commonly to dissect, it is endued with fleshy Fibres; in the birth it is red, but in those of ripe age, white; in the forehead and neck it is more fleshy. Within it is bedewed with a viscuous Humour, to further their motion, by keeping the superficies of them from desiccation, which otherwise might fall out by reason of their motion. It is of an exquisite sense, whereof when it is pricked with sharp Humours, it causeth groovings, such as are felt in the beginning of Ague-fits. First, it preter-veth the heat of the internal parts. Secondly, it furthereth the ga-  
B thering

4.  
*Membr-  
na car-  
nosa.*

Its uses

thering of the fat. Thirdly, it strengtheneth the Vessels which pass between it and the skin.

#### CAP. IV.

#### *Of the proper containing parts.*

**T**HE proper containing parts, are the Muscles of the belly, and the *Peritonæum*. Of the muscles we have spoken elsewhere, Chap. 17.

*Peritonæum* is tyed above to the Midriff, below to the share and flank bones; in the fore-part firmly to the transverse muscles, but chiefly to their Tendons about the *Linea alba*; behinde to the fleshy heads of these Muscles loosely, and the membrane of the Nerves, which come from the *vertebra* of the loynes. The end of this firm connexion is to presse equally the belly, for the expulsion of the Ordure, and breathing. If this connexion had not been, the *Peritonæum* would



would have become wrinkled, the Muscles being contracted. If it had not been loose tyed to the fleshy parts, the contraction of them in the compression of the belly had been hindred.

As for the proceeding of it, *Fallopian* will have it to proceed from a strong twisting of sinewes, from whence the *Mesenterium* hath its beginning. Some will have it to proceed from the Ligaments by the which the *vertebrae* of the loyns and the *Os sacrum* are tyed together.

*Picolhominens* will have them to be framed of those nerves which spring out of the *spinalis medulla*, about the first and third *Vertebra* of the loynes, which are tyed together by both the meninges, when they march further: Here it is very thick, because it was to be much extended.

It is double every where, but chiefly about the *vertebra* of the loynes, where between the duplications lye the *Vena cava*, the *Aorta*

and the Kidneys. In the *Hypogastrum*, two tunicles are apparently seen, between which the bladder and matrix lie. All the parts which receive nourishment from the *Vena cava*, are seated between the coats, as the afore-named parts; but those which receive nourishment from the *Vena porta*, as are they which serve for concoction of the nourishment, are not; the umbilicall Vessels also are placed in the duplicature of the *Peritoneum*, that they may march the more safely.

To the beginning of the productions of the *peritoneum* the inner coat cleaveth firmly, and shutteth the hole by the which the spermatick vessels passe from the lower part of the belly. If this be broken, the outer coat is relaxed, and so a rupture is caused.

The *Peritoneum* is thickest; First, where there are manifest humours, to hinder the breaking of the subjacent parts, and issuing out of them, as above the stomach.

Secondly,

Secondly, where many vessels and spirits are, as above the spleen.

Thirdly, where much stretching is required, as above the bladder, matrix, and stomach.

C A P. V.

*Of the Omentum.*

**T**He parts contained serve either for nutrition, or procreation. As for the parts serving for nutrition, they either serve for chylickation, or sanguification. The principall efficient cause of chylickation, is the stomach; but the adjuvants are the *Caube*, & the *Pancreas*.

The principall efficient causes of sanguification, are the liver and spleen, but the other parts are the adjuvant causes. Of these some receive the excrements of the chylickation, as the guts. The excrements of the sanguification are two, choler, and the watrish humour. The thinn Choler is received

Of the part contained in the lower belly

by the *vesica fellea*; but the grosse choler, by the *meatus cholidochus*: The watrish humour is turned to the kidneyes, and from thence to the bladder, by the ureters.

The parts appointed for procreation, are the genitals, both in men and women. Next then to the *Peritoneum* is the *Omentum*, or caul, in Greek it is called *ἐπιπλῆον*, *ἐπὶ τὸ ἐπιπλῆον*, because it seemeth to swim above the upper guts. The *Arabians* call it *Zirbus*.

Its substance.

It is composed of two membranes. The uppermost doth spring from about the bottome of the stomach, from the common coat of it, and is tyed to the hollow part of the liver and spleen.

Its connexion.

The lowermost doth spring from the *Peritoneum*, immediately under the midriff towards the back, and is tied to the hollow part of the liver, to the midriff, to the *duodenum intestinum*, to the convex part of the spleen; and last of all, to all that part of the *Colon* which marcheth under the stomach.

It

It hath veines onely from *porta gastroepiplois dextra & sinistra*: they are inserted into the upper membrane, but *epiplois dextra & postica* into the inferiour membrane.

Its veins

It hath so many arteries from *ramus celiacus, & mesentericus*.

Its arteries.

It hath small sinewes from the costal branch of the sixth paire. It hath much fat: if it be plentifull, and the canle reach to the *os pubis*, in women it causeth sterility, by compressing the mouth of the matrix; in men it causeth a Rupture, by relaxing the *peritoneum*: This rupture is called *epiploenteroceles*.

Its sinews.

In figure it representeth a Faulconers pouch, according to *Galen*: The mouth is round, and the bottome is made by the two membranes joyned together. This will appeare if you fill it with water, by *Galens* advice.

Its figure  
6 De anat  
administ

It is then of substance membranous, that it might admit dilata-

The reason of the frame of it.

tion and extension. It is thin, that it should not burden the subjacent parts; it is compact to hinder the dissipation of the internall heat, and to repel the externall cold.

The fat.

The fat is about the veines and arteries, to strengthen them from being compressed by the repletion of the belly, and other motions. When the stomach is full, and the guts empty the upper membrane is raised, the lower remaining in its owne place; but if the guts be full, and the stomach empty, then the lower membrane riseth up, the upper remaining in its own place. It is tyed to the stomach, being a middle part between the colon and the spleen; and that it should not totter from side to side, It is tyed in the right side to the colon and liver; but in the left side to the spleen.

Its beginning.

It hath its beginning from those parts unto which it is tyed, that it might receive veines and arteries from thence for bloud and life. The lower part is free and untied,

that

that sometimes the upper, sometimes the lower membrane might rise up.

The uses of it are three: First, it cherisheth the internall heat of the stomach and intestines.

Secondly, it minstreth nourishment to the parts in time of famine, *Galen. de us. part. l. 2, c. 11.*

The third is to contain the humours flowing from the intestines, which the glandules cannot receive wholly at one time, *Hippoc. lib. de glandulis.*

Creatures which have no caul, help the concoction, by doubling their hinder legs, and resting their belly upon them, as Hares and Conies.

They who have had a portion of it cut off, because it was corrupted, having fallen out by reason of a wound received in the *abdomen*, have afterward a weak concoction, and are enforced to cover the belly well. See *Galen. lib. 4. de usu part. 9.* where he proveth this by example.

An observation.

Another.

CAP. VI.  
Of the Gula.

The  
march-  
ing of it.

**T**He Gullet or weazand is an organically part, which beginneth about the root of the tongue, and passeth from thence directly between the wind-pipe, the *vertebra* of the neck, and the foure first *vertebra* of the brest, upon the which it resteth; but when it is come to the fifth *vertebra* of the brest, it giveth way to the trunke of the great artery descending, by turning a little to the right side: afterward accompanying the arterie to the ninth *vertebra*, there it is raised up by meanes of the membranes from the *vertebra*, and marching above the arterie, it passeth through the nervous body of the midriff, and is inserted into the left orifice of the *ventriculus*: about the eleventh *vertebra* of the brest.

The  
names of  
it.

It is properly called *σώματι ἐν  
σερὸς καὶ μακρὸς*, quia angustus &  
longus



*longus*: see *Aristot.* 1. *histor. animal.* 16. It is also called *δισφαγόν*, *ἐπὶ οὗ τὸ φαγνύμα*, *quod cibum ad ventriculum vehat.*

It is framed of three membranes. The first is the uttermost and common, compassing the two proper, which it hath either from the *peritonæum*, according to some, or from the ligaments of the *vertebra* of the neck and brest, upon which it resteth. The second is the middlemost, and it is fleshie and thick, and hath onely transverse fibres. The third is the innermost, and it is membranous, and hath onely small and straight fibres.

It is joyned to that membrane which covereth the throat, palat, mouth, and lips; so that before vomiting, signes in the lips will appeare.

It hath veines both from the *venacava*, and the *porta*; for it hath sprigs from *vena sine pari*, while it is yet in the brest: but where it is joyned to the ventricle, it hath some twigs from *ramus coronarius*,

Its structure.

Its connexion.

The vessels.

*rius*, which proceedeth from the *porta*.

It hath arteries from the intercostall arteries, and *ramus caliacus coronarius*.

Nerves it hath from the sixth paire, which are carried obliquely, for safety, as *Galen* noteth l. 6, *de usu part.* and are very many; which is the cause that the parts about the upper orifice of the ventricie are so sensible.

Its glandules.

It hath foure *Glandules*; two in the throat, which are called *Tonsilla*, or Almonds, common to the *Weazand* and the *Larynx*, which prepare the pituitous humour to moisten them: other two it hath about the middle of it, towards the back, about that place where the *aspera arteria* is divided into two branches, under which it lieth.

The use of it.

The weazand serveth as a funnell to carry meat and drink to the maw; for it receiveth them by dilating its proper internall coat, and turneth them downe by the contraction

striction of the middlemost coat, and the muscles of the *Pharynx*.

CAP. VII.  
Of the *Ventriculus* or  
*Stomack*

**T**Hat part which we term the Stomack in English, in Latin is called *Ventriculus*, to distinguish it from the great ventricles. In Greek, *γαστήρ* and *κοιλία*, from its cavities.

Its denomination

It is placed immediately under the midriff, which it toucheth; wherefore if it be too full, it causeth a difficulty of breathing, by hindering the motion of it. In the forepart, and in the right side, it is covered with the hollow part of the liver; in the left side by the spleen; towards the back by the *aorta*, the *venacava*, and the *pancreas*, which further its heat.

Its situation.

The bignesse of it is commonly such, as is capable to receive so much

Its bigness.

much food at one time, as is sufficient for nutrition. It is lesse in women than in men, to give way to the distention of the matrix. They who have large mouths, have large stomachs.

Its connexion.

It is joyned with the *gula* on the left side, where its upper orifice is: it is tyed to the *duodenum*, where the lower orifice is on the right side. The bottome is joyned to the upper part of the caule.

Its substance.

The substance of it is membranous, that it might admit distention and constriction. It hath three membranes. The first is common; which it hath from the *peritoneum*, about the upper orifice; it is the thickest of all those which spring from the *peritoneum*; the fibres of it are straight.

The second is fleshie, and the fibres of it are transverse; under which a few oblique and fleshie lye.

The third is membranous; endued with all kinds of fibres; the straight are most conspicuous, and plentifull,

plentifull, to embrace the food firmly, untill chylification be perfected, as the second membrane hath oblique to expell the chylus.

It hath also two orifices.

The one is in the left side, called *sinistrum*, wider than that in the right, that meat not well chewed might the better passe. It is called in Greek *πύλῳς*, *Cor*, from whence the paines which happen in it are called *καρδιαγία*, and *καρδιογυνοί*, because there is a great consent between it and the heart, by reason of the twigs of nerves which proceed from the same branch, which doe spring from the sixth paire, communicate to both; so that one being affected primarily, the other must suffer by consent.

This hath orbicular fibres, that the meat and drink being once received within the capacity of the stomach, it might be exactly shut, lest fumes and the heat should break out, which might hinder concoction.

Its orifices.

I.

The

The other by the Græcans is called πύλος; janitor, or doore-keeper, because it, as a Porter, doth make way for the *Chylus* to descend to the *duodenum*: It is not wide as the other *orifice*, because it was onely to transmise the elaborate *Chylus*: wherefore besides its transverse fibres, it hath a thick and compact circle, representing the sphincter muscle, that it might the more easily open and shut.

Its veins.

It hath veines, first, from the trunk of *vena porta*, and this is *pyloricus ramus*, or from the branches of the same: wherefore from *ramus splenicus* it hath *gastrica*, from whence *Coronaria* springeth; *Gastroepiplois sinistra*, & *vas breve*, from the *ramus mesentericus*, before it be divided it hath *Gastroepiplois dextra*.

It hath *Arteries* from *ramus celiacus*, which doe accompany every veine.

Its arteries.

It hath many nerves from the sixth paire, which with the *gula* passing through the midriffe, crosse one

one another; for the right finew doth compasse the left and forepart; but the left, the right and hinder part of the stomach. So that the upper part of the stomach is of an exquisite sense. These three vessels passe betweene the common and proper coats, and end in their orifices, in the internal membrane.

It is the seat of hunger, and soonest doth feele the defect of aliment: for blood being spent in the veines, upon the nourishment of the body, the *fibres* of the internal membrane of the stomach are contracted, and so this pain which is called hunger, is caused.

The action of the stomacke is Chylification: now *Chylus* is a white juyce, reasonable thick, like Barley creame, wrought by the faculty of the stomach out of the aliments. This is chiefly elaborate by the heat of the stomach, yet the adjacent parts putting to their helping hands; as in the right side, the

The  
cause of  
hunger.

Its action  
on *Chylus*

the liver; in the left, the spleen: above the midriffe, below the guts, before the caule, behind the trunks of *vena cava*, and the *aorta*. This heat of the stomach is temperate, and somewhat moist, that this concoction might resemble boyling.

Its figure

Of figure, it is round moderately; partly, that it should not take too much room; partly, that it might receive much. It is somewhat long, and hath two orifices higher than the bottom, lest if one should have been in the bottom, the aliment unconcocted should have issued out of it.

## CAP. VIII.

*Of the Intestines, or*

*G. V. T. S.*

The cry-  
mon.

**T**He Guts are called in Latine *Intestina*, in Greek *Εντερα*, *ἔντερά*. They begin at the *Pylorus*, and end in the Fundament.

They



They have a round figure, that they might contain sufficient nourishment.

The figure.

They are of a membranous substance, that they might readily have constriction and dilatation.

Their substance

In length, they are six times as long as the whole body.

Their length.

They have three coats, one common from the *Peritonaum*, but mediately; for in the *Duodenum*, and that part of the *Colon* which cleaveth to the stomach, it proceedeth immediately from the lower membrane of the caule; but in the *jejunum*, *ileum*, the rest of the *colon*, and thick guts, it proceedeth from the membranes of the *mesenterium*.

Their coats.

They have two proper, to retain, and expell readily: The outermost is membranous, the innermost nervous; although it seem to be fleshy, by reason of the crusty substance with which it is lined; which is framed of the Excrements of the third concoction of the guts themselves. It is also glazed

sed with a mucous substance, which is nothing else but an excrementitious flegmy substance, bred in the first concoction: This furthereth the expulsion of the *faces*, and hindereth excoriation, which might be caused when sharp humours passe thorow them.

The  
fibres.

This internal membrane in the small guts hath oblique fibres, but the external transverse, because these are appointed for the retention and expulsion of the *chylus*. But in the thick guts, the inner membrane hath transverse, but the outer hath oblique and straight, because they are appointed for the expulsion of the excrements: The inner membrane of the small guts is full of wrinkles, to stay the *chylus* from passing too soon. Between the common coat and those which are proper, the *vena & arterie Mesaraica* march.

Their  
Veins.

The veins flow from the *Porta*, although not from the same branch: or the *duodenus furculus*, is sent into the *duodenum*, and the

*Hæmor-*

*Hamorrhoidalis*, to the left part of the colon, and the whole *rectum*, as the *dexter mesentericus* is sent to the *jejunum*, *cacum*, *ileum*, and the right part of the colon. *Epiplois postica*, is inserted into the middle part of the colon, which marcheth transversly under the stomach; besides these, a sprig from the *ramus epigastricus* of the *vena cava* is sent to the *intestinum rectum*, which maketh the externall *hamorrhoidal*.

The Arteries spring partly from *ramus coeliacus*, partly from both the *mesenterica*, to the *duodenum*, and the beginning of *jejunum*; a sprig is sent from the right *ramus coeliacus*; but to the rest of the *jejunum*, to *ileum*, *cacum*, and the right part of *colon mesentericus superior*: to the left part of *colon*, and to the *intestinum rectum*, *mesentericus inferior* is sent. At the last, *epiplois postica*, which riseth from the lower part of *arteria splenica*, which is the left branch of *arteria coeliaca*, is sent to the middle part of *colon*, which lyeth under the stomach,

The Arteries.

Nerves

The  
Nerves.

Nerves they have from the sixth paire; the *duodenum* hath small twigs from the stomach, which goe to the *pylorus*. The other guts have very many, which spring from the branch which is bestowed upon the roots of the ribs: but the *intestinum rectum*, about the *podex*, hath foure twigs from the fifth conjugation of those which spring from the *os sacrum*. This is the cause why so great pain is felt in the *colon*, & *rectum* when they are ill affected.

## The fat.

The guts have fat without, and not within.

The differences of  
the guts.

The guts are of two sorts; for they are either thin or thick.

## The thin

The thin, which have thinner membranes, are in number three.

1.

The first is *duodenum*, because it is thought to have 12 inches in length. It doth passe directly under the stomach, to the beginning of those guts which begin to be gathered by the *mesenterium*, for this is tyed with it.

2.

The second is *jejunum*, or the hungry gut; for in dead carcases it

it is for the most part found empty; partly, by reason of the multitude of the Veins; partly, by reason of the acrimony of the choler, which proceedeth pure from the liver. In length it is 12 hands breadth and three inches, and as broad as the ring finger. The internall membrane is longer than the external; for it hath innumerable orbicular, and transverse wrinkles to stay the *chylus*. It beginneth on the right side, under the *colon*, where the *duodenum* endeth, and the guts begin to be wreathed, and filling almost the whole umbilicall region, it endeth into the *ileum*; of all other guts it hath greatest store of veins and arteries; and by these you may finde the circumscription of it. *Meatus biliarius* is inserted into the beginning of this gut, which sendeth choler from the gall, which pricketh the guts to hasten expulsion.

The third is *ileum*; it hath thinner membranes than the rest of the *tennia*. It is seated under the navel,

vell, and filleth both the *Ilia*. It is the longest of all the guts, for in length it containeth 21. hand-breadths; but it is the narrowest of all, for it is but an inch in breadth. It hath fewer wrinkles then the *Jejunum*, and lesser, which about the end of it scarcely appear.

It beginneth where both smaller and fewer veins appear, and endeth about the place of the right Kidney; where it is joyned both with the *Intestinum caecum*, & colon. The external coat of the *tennia intestina* is more thin and fleshy then the internall. It hath transverse and orbicular fibres, with a few straight to strengthen the transverse. The internall coat it hath partly straight, partly oblique fibres: yet fewer straight than the *crassa intestina* have. These guts have a motion such as worms have when they crawl, or leeches when they suck, to draw downward the *chylus*: for it is not in our power to send this away, as we do the excrements. The *crassa intestina*

*stina* have not this motion, and by reason of this motion, the upper part of the gut may be wrapped in the lower, which causeth the sicknesse called *ileos* or *convulsus*.

Now follow the *intestina crassa*, the great guts; they are three in number also.

The thick guts.

The first is called *cæcum* τυφλόν, the blind gut, because one end of it is shut, so that at the same orifice the *chylus* passeth, and returneth. In man it is like a thicke round worme coyled together. It is bigger in an infant than in a man; four inches in length and one in bredth. It is not tyed to the *mesenterium*; but being couched round, it is tyed to the right kidney. In sound persons it is alwayes empty. In foure-footed beasts it is alwayes full of excrements. Apes have it larger than a man, Dogs larger than Apes; but Conies, Squirrels and Rats, largest of all, if you consider the proportion of their bodies.

I.

The second is *colon*, κόλον, ὡς τὸ

2.

C

κωλύειν

*κωλύειν*. because it detaineth the excrements. It hath its begining from *ileum & cæcum*, and mounting up by the *dextrum ilium*, when it comes to the liver it passeth transversely under the stomach to the left *ilium*, and from thence to the beginning of *os sacrum*.

It is tyed first to the right kidney in the right side, by the externall membrane; then in the middle to the bottome of the stomach, and at the last unto the left kidney. In length, it is of seven hand bredth and seven inches. It is the broadest of all others that it might contain all the excrements.

It hath cells, which spring from the interall tunicle of it: These cels are kept in their figure, by a ligament halfe an inch broad, which passeth through the upper and middle part of it all alongst; this being broken or dissolved, the cels appeare no more. Their use is to hinder the flowing of the excrements to one place, which would presse the parts adjacent.



It hath a valve where it is joyned with *ileum*, like to the *Sigmoides* in the *Sinus* of the heart. This valve so stoppeth the hole which is common to the *ileon* and *colon*, that flatuosity cannot ascend to the *ileum*, much lesse excrements regurgitate. If one would find this out, let him pour in water into the *Intestinum rectum*, and hold up the guts: The water will stay when it is come to the valve, if it be sound. If this valve be relaxed by sickness, excrements may regurgitate; and expelled by vomit and clysters, also come to the stomach.

The third is *intestinum rectum*, the straight gut: it hath its beginning where the *colon* endeth; and endeth where it maketh the *anus*: it is of a span in length, not so wide as the *colon*, the muscle *σφιγκτης* is at the end of it: It hath thick and fleshie externall coats, and so a solution of unity in it may the sooner be united. It hath many transverse fibres, few oblique, and some streight. It hath veins not from

3.

*Porta* only as the rest; but from the trunk of the *Cava* descending also, which make the externall Hemorrhoidall.

The guts have a threefold use; for first, they all concoct the *chylus* sent from the stomach better.

Secondly, the small guts digest the *chylus*.

Thirdly, the thicke guts expell the excrements.

## CAP. IX.

### *Of the Mesenterium*

**T**He substance is membranous; First, that it might bee light, and should not presse together the vessell by its weight: Secondly, that it might bee extended into all dimensions, by reason of the fibres: Thirdly, that betweene the membranes it might the more readily gather fat.

It is of a circular figure, which is most capable, that it might answer the length of the guts, and keep

keep them within a small compasse and place likewise.

It is framed of two proper membranes, one above another, strong enough; and one common, between which and the proper, the vessels passe safely to the guts.

The veins are called *Mesaraicae*, these spring from *ramus mesentericus*, *dexter* & *sinister*, branches of the *Vena Porta*.

It hath also two arteries, the one superior, the othe inferior, branches of the *arteria mesenterica*, which passe as the veins doe.

As for the nerves, it hath two on each side, springing from the branches of the sixth pair, which goe to the roots of the ribs; others it hath from those which spring from the *spinalis medulla*, between the first, second, third and fourth *vertebrae* of the loynes.

That the vessels mighs passe safely without ruption, Nature hath placed glandules betweene the divarications of the veins and arteries.

Glandules.

The biggest.

The biggest of these is about the center of the *mesaraeum*, where the distribution of the vessels beginneth.

If this become scirrhus, the extenuation of the whole body ensueth, because the passing of the *Chylus* is hindered : leane persons have larger glandules than the fat, because the fat doth sufficiently guard the distribution of the vessels, and preserveth the heat of the vessels.

The arteries bring spirit ; but the veins doe bring both the *Chylus* to the liver, and nourishment to the inner parts ; but not at the same time : As we take breadth by, and let it out by the same instruments, but not at the same time : see *Galen 2 facult. nat. 13. & 4. de us. part. 14.* So at one time the liver draweth from the belly, and at another time the belly from the liver. When the guts are full, the *Chylus* is sent to the liver ; but when they are empty, they draw nourishment.

It hath two parts, *Mesaraeum*,  
*μεσάρειον, ὅτι μέσον τῆς ἀρτηρίας ἐντέρων*  
*ὅσῃς*

ἔστι; and μεσσηνῶλον, quasi μέσον τῶ καλῶ.  
The first tyeth the small guts together; the second the thick.

The *Mesaraeum* is in the circumference three yards, but a span in bredth.

It springeth from the ligaments of the *vertebrae* of the loynes, by two roots; the largest about the first *vertebra*; the other lesser, about the third. It was fit that it should be tyed strongly to these ligaments, lest it might have been torne by violent motions, nor be pulled from thence by the weight of the guts being full.

And as plants draw their nourishment by their roots from the earth, so living creatures which have blood, draw their nutriment from the guts; by the *mesaraick* veines. Wherefore lest they should suffer ruption, Nature would have them to passe safely between membranes.

The use of it then is to carry safely the vessels which passe to the guts.

The big-  
nesse of  
the *Mesaraeum*.  
Its be-  
ginning,

It is tyed before to the small guts; but behind to the first and third *vertebra* of the loyns, from whence it springeth.

It is called *μειντέριον*, & *μειντέρων*, *quasi μέσον τῶν ἐντέρων*.

*Mesocolon*

*Μεσοκῶλον* is that by the which the thicke guts are tyed together. *Hippoc. 6. Epid. & Galen. 4. Aphor. 6.* make mention of this. It is tyed in the right side, to the right part of the *ileum*; but in the left side to the left part of *ileum*, and the muscle *psoas*: before it is tyed to the *colon*, & *rectum intestinum*.

## CAP. X.

### *Of the Vena lactea.*

**T**His is the opinion of all the ancient and modern Writers, concerning the mesenterie, and the meseraicall, if you except *Caspar Asellius*, who by his diligence found these veins, which hee calleth *lacteas*, because they contain a white juyce, which is nothing else but

Why so called.

but the *chylus* elaborate, which they carry from the small guts to the liver.

Their beginning seemeth to bee in the *Pancreas*, for there they all meet, and are strangely implicate and twisted together: from thence they passe upward to the liver, and downward to the small guts: so that the *Pancreas* is a more excellent part than it hath been hitherto taken by other Anatomists: and as the mothers blood before it bee sent by the *vasa umbilicalia* to nourish the infant, is first committed to the *placenta uteri*, to draw from it all impurity: so then these *vena lactea* discharge their impurities, before they carry the *chylus* to the liver in the *Pancreas*.

Their beginning.

They are inserted into the small guts, and have nothing to doe with the stomach. They passe into the capacity of the guts, and end in the wrinkled crust, with the which the internall membrane of the guts is lined, with their spongius heads like to Leeches, by the which they

Their insertion

Their  
progress.

draw to themselves the *chylus*.

From the small guts, they march betweene the two membranes of the *mesenterium*, sometimes severed from the other vessels, sometimes joyned with them, sometimes directly, sometimes over-riding them, making a Saint *Andrewes* crosse thorow the *glandules*, untill they come to the *Pancreas*, where they are inexplicably twisted one with another: from thence having greater branches they passe by the sides of *vena porta* to the cavity of the liver, where they are spent by ending there by small twists: and so it is most likely that sanguification is performed by the substance of the liver, and not by the veins: the grosser part of it being sent to the branches of *vena porta*, and the subtilest to the branches of *vena cava*.

They differ from the ordinary mesaraicall veins;

First, in bignesse; for these are bigger, but thole are more in number; for they are twice as many:

for

The difference  
betweene  
them and  
the ordinary  
mesaraicall  
veins.



for more *chylus* must be sent to the liver to make blood of, for the nourishment of the whole body than blood for the nourishing of the inward parts only.

Secondly, the valves which are seene about the endings of these, are placed from without inwards, but of these from within outwards. The reason of this diversity is this: the *vena lactea* suck the *chylus* from the guts, which ought not to returne; but the ordinary mesaraicall send blood, and sometimes excrementitious humors, which ought not to come backe again.

If you would find out these veins, you must feed a dogge with milk, and five or six houres afterward dissect his belly; then by stretching the mesentery you shall perceive them.

That the Ancients did not find out these veins, the cause is: either because they dissected beasts after they were dead; or after that the *chylus* was distributed, or they did presently take a view of the mesentery;

Their valves.

How to find the out.

Why the Ancients did not finde these out.

Why they  
have no  
crunck.

mesentery; but made some stay about the inspection of some other part.

They have no trunck, because they were to end in the liver, and to goe no further. From this part many diseases spring: first, because it is composed of two membranes, having innumerable veins and arteries, and so it may containe many impurities: secondly, because it hath many glandules, which as a sponge imbibe superfluities.

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CAP. XI.  
*Of the Pancreas.*

**I**T is called *pancreas*, and *pankreas*. It is the biggest glandule of the whole body, and very red, like unto soft flesh, from whence it hath its name.

In figure it is ovall, three or foure inches in length. It is placed in the left side towards the spleen; above, the stomach resteth upon it; below, the membranes of the *peritonaeum*

*peritoneum* lie, unto which it is firmly tyed. It doth keepe within it selfe *ramus splenicus*, the left branch of *arteria cœliaca*, the nerves which passe from the sixth paire to the stomacke and the *duodenum*.

It hath a membrane from the *peritoneum*, by the which it is covered and holden up.

It hath three uses. First, it stayeth the liver, lest it being distended by too much meat and drink, should be hurt by the hardnesse of the *vertebra* of the back.

Secondly, to keepe the vessels passing through it from ruption.

Thirdly, to keep these same from compression, when the stomacke is too much stretched by meat and drink.

## CAP. XII.

## Of the Liver.

*Now follow the parts appointed for sanguification, whereof the Liver is the chieft.*

**T**He substance of the Liver seemeth to bee a red fleshy masse. In the first formation of the birth it is framed of blood wizing out of the veines, and there coagulating about them.

The substance of the Liver is so set about the branches of the *vena porta* and *cava*, that it filleth up all cavities, and doth firmly stay them, keeping them open from purring together, and in comely order, that they be not confounded. It is the thickest and heavieft of all other entralls.

Its biggest  
veins.

It is bigger in man than any other living creature, if you consider the proportion of his body; for it was fit so to be, seeing man

was

was to have the greatest store of blood, lest spirits should faile in performing the functions of the soule; wherewith man is most copiously furnished. Besides, seeing he hath but one Liver, the bignesse was to recompence the number: wee may ghesse of the bignesse of it by the bignesse of the fingers.

It is covered with a very thin membrane, which springeth from the second ligament of the Liver, which cleaveth firmly to the substance of the Liver. If it be separate at any time by a watrish humour, issuing out of the vessels from the fleskie substance, watrish pustuls, by the Grecians called *Ascites*, are ingendered. If these doe breake, the water falleth into the cavity of the belly, and causeth that kind of dropsie called *ascites*.

It hath veines as well from the *cava* as the *porta*.

The branches of the *cava* are distributed for the most part thorough

Its veines

row the gibbous part; but those of the *porta*, into the hollow part: yet so that the branches of both are joyned by inosculation to deliver the purest blood to the *vena cava*, for the nourishment of the vitall parts; and the grossest by the branches of the *porta*, for the nourishment of the naturall. There seemeth to be three times more of the twigs of the *porta*, than of the *cava*, within the liver.

Amongst the midst of the branches of the *porta*, some little veins march; which afterward becoming one twig, end in the *vesicula fellea*, that the bilious humour may be sent to it, before the blood enter into the *venacava*.

Its arteries.

It hath onely few arteries, which springing from the right branch of the *cœliaca*, end in the hollow part of the Liver, where the *vena porta* commeth out.

Its nervs.

It hath two nerves, but very small, because it hath but a dull sense. One commeth from the branch which is sent to the upper orifice.

orifice of the stomach, the other from that branch which is dispersed thorow the roots of the ribs of the right side.

As for the figure of it, it is almost round; the upper part is arched and smooth, and so framed, that it might not hurt the *diaphragma*.

Its figure

The lower part is hollow to receive the stomach, which is of a sphericall figure.

In the upper and convex part, which is distant but one inch from the *diaphragma*, to give way to it when it is dilated in breathing, and to the stretching of the stomach: it is tied first to the *diaphragme*, by a ligament membranous, broad, and strong, which springeth from the *peritoneum*, where it covereth the midriff in the lower part. It passeth transversly by the Liver, to the hinder parts; by this ligament, it is stayed from falling downe. It is called the Suspensory.

Its ties.

Secondly, in the fore-part it is stayed

stayed by two ties; by the first it is tied to the *mucronata cartilago*, to hinder it from falling to the back parts, when we stretch our back: this ligament is broad, double, and strong, and springeth from the *Peritoneum*, and giveth the Liver its coat. Into this coat the two sinewes are implanted, according to *Galen, lib. 3. de loc. affect. cap. 3.* and not into the substance of the Liver; so that, according to *Galen. 4. de us. par. cap. 13.* it hath but a dull feeling, such as plants have to embrace that which is profitable, and to leave that which is unprofitable.

By the second it is tied to the navel: this is the umbilicall veine, which when the Infant is borne, loseth its hollownesse, and becometh a ligament. This stayeth it from being pulled upwards.

Thirdly, it is tyed to the short ribs, by small fibres, to keepe it steady. In the hollow part it is tied by the *mesenterium*, to the ribs by the *vena cava*.



Its differences from the Liver of beasts.

A little Lobe.

Its situation.

It differeth from the Liver of beasts, in that it hath seldom any lobes; yet the hollow part of it hath a fissure, or chink wherein the umbilicall veine is implanted, and two small bunchings out in the right part, where the *Vena porta* marcheth out, which *Galen* calleth *πύλας*, gates.

Besides these, there is a little lobe of a softer and thinner substance than is the rest of the Liver, and is covered with a membrane: It is tied to the *Omentum* by this lobe, by the which *Spigel. de human. corp. fabric. lib. 8. cap. 12.* thinketh that waters may be discharged out of the Liver into the caul.

It is placed in the lower belly, in the right side, covered with the ribs for safety, and in the middle of the trunck of the body, to send blood equally to the upper and lower parts. The stomach is cherished by it, and the spleen; but because it is a more noble part than the spleen, it is placed in the right *hypochondrium*.

The

Action

The proper action of it is not only to further sanguification, perfected in the veines, as all ancient Anatomists averre; but to sanguifie the *chylus*, carried to it by *vena lactea*, as *Asellius* hath proved.

A note.

One thing is to be noted, that the substance of the Liver, in the convex part, where the *vena cava* is lodged, is softer than that which is in the hollow part, where the *vena porta* is; for there it may be more easily separate from the vessels, than here; and not without cause: for the roots of *vena porta* ought to bee stayed by a harder substance, that they be kept wider; but the roots of the *cava* with a softer, that they might the readier be filled, stretched, and flacked.

CAP.

## CAP. XIII.

*Of the vena portæ.*

SEeing the roots of the veines which Nature hath appointed to furnish blood, the nutriment of the body, have their roots in the Liver: having discoursed of it, method doth require to set downe the doctrine of them.

Although there is but one artery to impart life, yet there are two veines, the *vena portæ* and *cava*. Because some require a grosser blood for nutrition as those parts are which serve the nutritive faculty, which are, the liver, the gall, the stomach the spleene, the *pancreas*, the *omentum*, the guts, and the mesentery. For unto the rest, as the kidneys, bladder and those which are appointed for procreation, the *vena cava* sendeth branches.

It is fit to begin with the *vena portæ*, because it goeth no further then to the parts contained in the abdomen,

The  
veins of  
it.

*Vena  
portæ.*

abdomen, and not to all those neither.

Why so called.

It so called, because it seemeth to enter into the liver by the two fleshy bunches called *portae*, gates.

How it differeth from *Vena cava*.

This both differ from the *vena cava*.

First, in substance; for the substance of this is thicker and blacker, because it is nourished with thick and black blood; but that of the *vena cava* is whiter and thinner, because it is nourished with a thinner and redder blood.

Secondly, the substance of the *vena porta* is harder than that of the *cava*; which ought to be softer, because it ought to be more apt for dilatation and constriction; first, because it containeth a more moveable blood; partly, because its thinner, having much serosity mingled with it; partly, because for the most part the branches of it are accompanied with the branches of the great artery, whereas the branches of the *porta* are

are farre enough off, if you except *ramus splenicus*.

Thirdly, the trunck of *vena cava* is larger than that of *porta*, because it nourisheth more parts, as hath been said.

Fourthly, the *porta* hath more roots within the substance of the liver than the *cava*.

The roots of the *vena porte* and *cava* are joyned by the union called *Anastomasis*, or inosculation. This is performed by two wayes: First, when the ending of one doth meet with the end of the other; as the *epigastrica vena* meet with the *mammaria* in the lower side of the *musculi recti*.

Secondly, when one branch resting upon another, does cleave together, having a hole in the middle; this inosculation is seene in the roots of the *vena porte*, and the *cava*.

One thing is to be noted, that there are many of the twigs of the *vena porte* which touch not those of the *cava*; because the purest part

How inosculati-on is performed.

A note.

part of the blood was onely to be carried to the *vena cava*, and the thickest to remaine in the *vena porta*. By reason of these *Anastomases* in famine nourishment is sent from the habit of the body, by the *vena cava*, to nourish the internal parts.

*Bauhin* affirmeth, that there is a common conduit to the roots of *vena porta* and *cava* which in its cavity will receive a small probe. In these veines, besides blood, excrementitious humours are also contained in diseased persons, which sometimes are sent from the whole body by the *vena cava* into the guts, and sometimes communicate to the *vena cava* by *vena porta*.

How the  
inoscula-  
tion of  
these  
veins is  
found  
out.

To find out the radication and inosculation of these veines, you must boile the liver untill it become soft, and so with a wooden or bone knife separate the substance from the vessels; for a sharp knife is not fit.

Now to come to distribution of

*vena*

*vena portæ*, it hath parts : 1 *Radices*, the roots. 2 *Truncus*, the trunk. 3 *Rami*, the branches. 4 *Surculi*, twigs.

As for the roots, first from the circumference of the Liver, smal capillar veins march towards the inner part of it ; and by combination becoming greater, they make up five branches. These about the middle of the hollow part, yet towards the back joyning together, make up one root, which at the last coming out of the liver, about the eminences, called *portæ*, frame that trunk which is called *Vena portæ*.

This trunk parting a little from the liver, before it be severed into branches, it puts forth two twigs ; the one being small and springing from the upper and forepart of the trunk, as soon as it parteth from the liver, is inserted into *Cystis fellis*, about the neck of it, and spread by innumerable twigs, thorow the external coat of it.

*Vesalius* affirmeth, that there be

D

two

The distribution of *Vena portæ*.

Its roots

Its branches.

two of these twigs, from whence some call them *cystica gemellæ*: but this is a matter of no great moment. This twig may be called *surculus cysticus*, or *vesicalis*.

The second twig is bigger, but lower. This springeth from this same forepart, yet towards the right side, and is inserted into the bottom of the stomach: from hence it sendeth many sprigs toward the hinder part of it, towards the back.

It may be called *Pistoricus*, more properly then *Gastricus*, seeing there are other branches, which are called *Gastrici*. Having sent forth those two twigs, the trunk passeth down, and bending still a little towards the left side, it is parted into two remarkable branches; whereof the one is called *sinister*, or the left, seated above the right, but lesser: the other is *dexter*, or the right, lower then the left, yet larger: the left is bestowed upon the stomach, the *omentum*, a part of colon, and the spleen: the right



is spread through the guts, & the *mesenterium*; the left is called *vena splenica*, but the right, *vena mesenterica*.

The *vena splenica* hath two branches before it come to the spleen, the superiour and the inferiour. The superiour is called *gastricus*, or *ventricularis*. This is bestowed upon the stomach; the middle twig compassing the left part of the orifice of the stomach like a garland, is called *coronaria*: from the lower branch two twigs doe spring, the one is small; this doth send other twigs to the right side of the lower membrane of the *omentum*, and to the colon annexed to it. This is called *epiplois*, or *omentalis dextra*; the other is spent upon the lower membrane of the *omentum*, which tieth the colon to the back, and upon that part of the colon it is called *epiplois*, or *omentalis postica*: when the *ramus splenicus* hath approached to the spleen, it doth send out two other twigs, the uppermost and the lowermost: from the

B 2 Khes  
of Vena  
splenica.

uppermost *vas breve* springeth, which is implanted in the left part of the bottome of the stomacke commonly: from the lowermost, two twigs issue.

The first is called *gastroepiplois sinistra*, this comming from the lower part of the spleen towards the right side, is bestowed upon the left part of the bottome of the stomach, and the upper and left part of the *omentum*.

The second springeth most commonly from *ramus splenicus*, but seldom from the spleen; and passing along according to the length of the *intestinum rectum*, it is inserted into the *anus*, by many twigs. This is called *Hæmorrhoidalis interna*, as that which springeth from the *vena cava* is called *hæmorrhoidalis externa*.

*Vena Mesenterica.*

Now followeth *vena Mesenterica*, or the right branch of *vena porta*; before it be divided into branches, it sendeth forth two twigs.

The first is called *gastroepiplois sinistra*,

Fig. III.

I



*sinistra*, this is bestowed upon the right part of the bottom of the stomach, and the upper membrane of caule.

The second is called *intestinalis*, or *duodena*: It is inserted into the middle of the *duodenum*, and the beginning of the *jejunum*, and passeth according to the length of them. This branch as soone as it passeth from the back, it entereth into the *mesenterium*, and passing between the membranes of it, sendeth forth those meseraicall veins, which send nourishment to the inward parts.

It is divided into two branches, to wit *Mesenterica dextra*, & *sinistra*: *Mesenterica dextra*, placed in the right side, sendeth a number of branches to feed the *jejunum*, *cæcum*, and the right part of the *colon*, which is next to the kidney and  
ver.

It hath fourteene remarkable branches, but innumerable small twigs. One thing is to bee noted, that the greater branches are sup-

ported by the greater glandules, and the smaller by the smaller glandules. *Mesenterica sinistra* passeth through the middle of the *mesenterium*, and that part of *colon* which passeth from the left part of the stomach, to the *intestinum rectum*.

Its uses.

The chiefe use of the *vena porta* is, to nourish the parts which are appointed for nutrition, with thick and feculent blood: It ought to be thick, that it might bee the hotter; for heat in a thick body is more powerfull.

The second use is to further the sanguification of the liver.

#### CAP. XIV.

*Of the Vena cava dispersed within the trunk of the body.*

**W**ithin the trunk of the body, the *vena cava* hath two truncks; one called *ascendens* or going up, the other *descendens* or marching down.

The

The *ascendens* passing through the nerves, part of the *Diaphragma*, it marcheth upward undivided, until it come to the *jugulum*: yet by the way from its sides it sendeth two twigs.

Its sprigs

The first is *Phrenica*; this is inserted into the midriffe and heart; from hence springeth the *coronaria vena* which compasseth the basis of the heart, as a garland.

1.

The second is *vena sine pari*, so called, because it hath not a fellow in the left side, as other veines have. It doth spring about the fifth *vertebra* of the brest, from the hinder part of the *vena cava*, in the right side. This going down, it marcheth towards the *Spina*: when it is come to the eighth or ninth rib above the *Spina*, it is divided into two branches, to wit, the right, and the left; the left is inserted most commonly in the middle of the left emulgent vein. By this branch, blood, or waterish or purulent matter may be discharged by urine; the right twig is implanted

2.

The  
branches  
of *Vena  
sine pari*.

either into the trunk of the *cava*, or into *prima lumbaris*.

This being done, the *vena cava* ascendeth up to the *Jugulum*, being strengthened by the *Mediastinum*, and the glandulous body called *Thymus*. Here the *Vena cava* is divided into two remarkable branches, from whence those veins spring which are sent to the head, to the armes, and some muscles of the *abdomen*. One passeth to the right side, the other to the left; the one is called *subclavius*, because it marcheth under the cannel bone within: The other is called *axillaris*, when it is come to the arm-pit; from the upper part of the *Ramus subclavius* two remarkable branches proceed: the internall and externall jugular; in man the internall is biggest, but in beasts the externall.

The  
branches  
of *Ramus  
subclavius*.

I.

The internall jugular commeth out about the articulation of the cannel-bone with the *Sternum*; then it joyneth it self with the *soporall* artery, and the recurrent nerve:

nerve; and with its hinder and greatest branch, accompanied with the soporall arterie it entereth with the *cranium* at the hole of the *occiput*, by the which the sixth paire of nerves commeth downe, it entreth into the first and second *sinus* of the *dura mater*.

The externall jugular mounteth up to the eare under the skin, and the quadrat muscle which pulleth down the cheek alongst the neck: from this branch spring the veins which are opened under the tongue.

From the lower part of *ramus subclavius*, spring foure branches.

The first, *Intercostalis superior*, one on each side; it is small, and commeth out about the root of the bifurcation: then passing downe by the roots of two ribs, it bestoweth twigs upon the distances of these two ribs.

The second is *Mammaria*, this marcheth forwards towards the upper part of the brest bone: then it goeth downe by the sides of it,

2.

Springs  
spring-  
ing from  
the lower  
part of  
*Ramus  
subclavius*



and when it is come to *cartilago mucronata* about the sides of it, it commeth out : from thence it passeth straightwaies under the right muscle to the navell, where by an *anastomosis* it is joyned with the *epigastrica ascendens* : from hence commeth that great consent between the matrix and paps.

The third is *Mediastina*, because it is bestowed upon the *mediastinum*, together with the left nerve of the *diaphragma*, according to its length.

The fourth is *Cervicalis*, or *Vertebralis*. This passing thorow the holes of the transverse processes of the *vertebrae* of the necke, is bestowed upon the muscles of the neck which are next to the *vertebrae*.

## CAP. XV.

## Of the Gall.

**T**He Gall, called in Latine *Vesicabiliaria*, or *Folliculus felleus*, is a dissimilary part, in figure representing a Peare, hollow, and appointed to receive the thin yellow choler.

The description of it.

It is about two inches in length.

By its upper part it is tied to the liver, which doth afford it a hollownes to receive it; but the lower part which hangeth without the liver, it resteth upon the right side of the stomach, and the colon, and doth often die them both yellow.

Its bignesse.  
Its connexion.

It hath two membranes, the one common, which is thin and exterior, without *fibres*. This springing from the membrane of the liver, it onely covereth that part which hangeth without the liver; The other membrane is proper.

Its membranes.

This

The fibres of the pro-permembrane.

This is thick and strong, and hath three sorts of Fibres, the outermost are transverse, the middlemost oblique, and the innermost straight.

This membrane is harder and thicker in the neck; but thinner in the bottome. Within, it hath a mucous substance, engendered of the Excrements of the third concoction of the membrane, to withstand the acrimony of the choler.

It hath two parts, the neck, and the bottome.

The neck is harder than the bottome, and higher in situation.

It from the bottome by degrees growing narrower and narrower, at last endeth in the *Ductus communis*, or the common passage of the choler, to the beginning of the *Jejunum*.

This elongation of the neck of the *vesicula fellea*, is called *meatus cysticus*, because it springeth from the *Cystis*.

The choler is carryed to the neck of

The parts of it.

of the *cystis*, by many small veins, near to the roots of the *vena portæ* about the midst of them, and is discharged into the cavity of it, about the upper part.

How the choler is carried to the gall.

The *meatus cysticus* hath three valves, looking from without inwards, to hinder the recourse of the choler to the Liver.

Its valves

The other passage which carryeth the thick and corrupt choler, as that which is called *vitellina*, *arginosa*, *porracea*, &c. is called *meatus hepaticus*; because it passeth straightway from the Liver to the *ductus communis*.

*Meatus hepaticus.*

This passage hath no Valves; both these discharge their choler by the common passage into the beginning of the *Jejunum*, when the small guts are discharged of the *Chylus*.

Beasts which want the *vesica fellea*, have this *meatus hepaticus*, as Harts, Hynds, and fallow Deere, and those which have a whole hoof.

What beasts have this passage only.

The *Meatus hepaticus* passeth thorow

thorow the roots of the *vena cava*, by innumerable branches, which being gathered together become one branch; and being united with the *meatus cysticus* make up the *communis ductus*, which is inserted into the beginning of the *jejunum* obliquely, between the two membranes of the intestine, about the distance of two inches, before it perforate the second membrane.

The *vesica fellea* hath for nourishment called *cystica gemella*.

For life it hath sprigs of arteries proceeding from the *Celiaca*. To afford sense, it hath a small threed like a sprig of a sinew from the sixth paire.

Many times stones are found in it, but they being lighter then those of the bladder, swim above the water.

The use of these two passages, is to draw all superfluous choler from the *chylus*, and to turne it into the guts, where it affordeth benefits to nature:

For first by its sharpness it moveth

Its vessels.

Of the stones in it.

The use of the passages.

The uses of the choler.

veth the intestines to turne out the terrestrial excrements in due season.

Secondly, by reason of its thinnesse it doth cut and cleanse the small guts of flegme, which there is plentifully bred.

Thirdly, by reason of its driness it hindreth the encrease of putrefaction.

Fourthly, it furthereth concoction in the intestines by encreasing their heat: neverthelesse, naturally there can be no passage to carry choler to the bottome of the stomach.

For first, by reason of its acrimony it would corrode it.

Secondly, it would cause the crude nourishment to passe into the *duodenum*.

Thirdly, it would procure perpetuall vomiting. If it fall out that choler be carried to the bottome of the stomach by any passage than this, the party vomiteth choler, and is termed *πυρόκολος ἄνω*, but if it bee inserted into the end of the *jejunum*, then

3.

3.

4.

Why choler is not carryed to the stomach.

1.

2.

3.

then bilious dejections follow: and such a one is termed *πυρόχλη & κίτω*.

A note.

One thing I would have you observe; that the *porus biliaris* passeth by a straight course to the *ductus communis*, and not to the *vesicula fellea*, which thus you may shew: put a *catheter* into the necke of this passage neere the liver, the guts will bee blowne up, and not the *vesicula*. Againe, put the *catheter* into the common passage, and both the *cystis felleis*, and the *meatus cholidocus* will bee blowne up.

How the  
valvs are  
found  
out.

If you would finde out the three valves of the *vesicula fellea*, presse the choler with your fingers from the bottome towards the necke; where you finde the choler to stay, there the valves are.

CAP.

## CAP. XVI.

*Of the Spleen.*

**T**He Spleen or Milt in English, in Greek is called *Splen*, and *Lien* in Latin.

The substance of it is flaggie, loose and spongeous, net-like, which is the cause that it may imbibe much superfluity, and so become exceedingly swelled.

This substance is covered with a membrane borrowed from the *Peritonaeum*, which is inserted first into the straight line of the Milt, and then covereth the whole Spleen: It is thicker than that of the liver. First, because it hath a looser substance. Secondly, because it hath more arteries, which require a strong membrane to defend them. The straight line is in the hollow part, where the vessels of the Spleen doe enter into it.

In infants new born it is of a red

Its substance.

Its membrane.

Why it is red in Infants.



red colour, because they have been fed with elaborate blood; but in those of a ripe age it is somewhat blackish: being boiled it representeth claretwine. In man it is bigger, thicker, and heavier, then in beasts; for it is six inches in length, three in breadth, and one in thickness; yet according to *Aristotle*, 3, *hist. Animal*. 6. a convenient little one is better then a big one.

Its figure

In figure it is somewhat long, like an Oxes tongue.

Its situation.

It is seated in the left *'hypochondrium*: so *Hippocrat*. 6 *Epidem*. calleth it the left liver; and *Aristot*. 3. *part. Animal*. 7. the bastard liver, but is seated somewhat lower, because it was to draw the terrestriall part of the *Chylus*, before it come to the liver by *ramus splenicus*, that the blood may be made thinner, and purer; for such blood causeth men to be wiser, 2. *de part. animal*. 2. It is all couched within and under the short ribs; so that in healthful persons it cannot be felt; only

only if it be inflamed, a pulsation may be felt.

It is tyed to five parts; to the midriff and left kidney by small membranes, by its hollow part which giveth way to the stomach, being distended to the upper membrane of the *omentum*, and to the stomach by *vas breve*. In its arched part it is tied to the back, so that dints remain in it by the impression of the ribs.

It hath veines for nourishment from *ramus splenicus*; for life it hath arteries from *ramus coeliacus sinister*; but five times more than veines, for great heat is required for the elaboration of thick blood. These vessels enter into the spleen where the straight line is in the hollow side. They joyne often by *anastomoses*.

The arteries besides life afford unto the spleen two benefits.

First, they encrease the naturall heat of it, that it may the better concoct the grosser part of the *Chylus*,

Its connexion.

Its vessels.

The uses of the arteries of the spleen.  
1.

*Chylus*, which is sent unto it by the *ramus splenicus*.

Secondly, they further the expulsive faculty of it.

Now the spleen sendeth its superfluities to the kindneyes by two wayes.

First, by returning of them by *ramus splenicus* to the *vena portæ*, and from thence to *vena cava*, from whence they are sent to the emulgent veines.

Secondly, by a shorter passage they are sent from *arteria coeliaca* to the *aorta*, and from thence to the kindneyes by the emulgent arteries.

Last of all, it hath small twigs of nerves from the sixth pair, which are bestowed upon the investing membrane, but are not communicate to the substance: wherefore it must be but of a small and dull feeling: so that the paines which sundry ascribe to the spleen, are to be referred to the adjacent parts.

The use of the spleen, is also of the

By what  
ways the  
Spleen  
sendeth  
its super-  
fluities  
to the  
Kidneys.

1.

2.

The use  
of the  
Spleen.

the liver, is to further the elaboration of the concoction of the *Chylus*: for it is a bastard liver, according to *Arist. 3. de Histor. animal. 7.*

The sanguification of the spleen differeth in two points from that of the liver.

First, in the materiall cause; for the spleen maketh grosse blood of the more earthly part of the *Chylus*; but the liver farre purer of the thinner and more benigne part of the *Chylus*.

Secondly, it differeth in the finall cause; for the liver sanguifieth to afford nourishment both to the vitall and animall parts; but the spleen onely to maintaine the naturall parts, and not all of them neither.

Nature would have the naturall parts to bee furnished with grosse blood by the branches of *vena porta*, partly to encrease their heat; for heat in a thicke body is stronger; partly to afford them nourishment answerable

How the sanguification of the spleen differeth from that of the Liver.

1.

2.

Why the naturall parts are nourished with grosse blood.

swerable to their substance, for it is thick.

*Of the kidneyes.*

CAP. XVII.

Their  
denomi-  
nation.

**T**He kidney is called in Latin *Ren*, from *ῥέω*, to flow; because the serosity of the blood doth flow through the kidneyes to the ureters, and from thence to the bladder.

Their  
number.

They are in number two; not so much for the poisoning of the body, as for their use and necessity; that one being stopped, yet the cleansing of the blood might be performed by the other.

Their  
places.

They are seated in the loynes under the liver and spleen, and rest upon the muscles called *φῶα*, which move the theyght about their heads, under the which large nerves are couched, which is the cause that a big stone being in the kidney, a numnesse is felt in the foot  
of

of that side, the muscle *φῶα* being pressed down by it : They lie behind the guts. The right kidney hath the *cæcum*, but the left the *colon* above it. In man the right kidney is lowest, by reason of the greatness of the liver, and bigger also then the left ; yet it is not so fat as the left, by reason of the vicinity of the liver ; whose heat hindereth the encrease of fat.

In figure they resemble the *asarum* leafe, or kidney beane : towards the loynes they are gibbous, but hollow towards the guts.

As for their connexion, by the external fat membrane they are tied to the *diaphragma*, and the loynes ; by the emulgent vessels to the *vena cava*, and the *aorta*, and by the ureters to the bladder.

They are in length about five inches, in breadth three, and in thickness one ; yet they are somewhat broader above then under. They are smooth in the gibbous part, but unequal in the hollow

Their figure.

Their connexion.

Their bigness.

Their  
parts.

low part, to let in and out some vessels.

The parts are two ; to wit, the externall and the internall ; the externall are the membranes ; these are two.

Their  
mem-  
branes.

The one is common and externall, borrowed from the *Peritoneum* ; within the reduplication of which, the whole Kidney is lapped ; and therefore it is called *Renis fascia*. This membrane is compassed with copious fat ; so that the Kidney seemeth to be the fattest of all other intrals, according to *Arist. 3. Hist. Animal. 17*. Although each one be exceedingly fat, yet some part of the Kidney will remain uncovered about the middle.

The uses  
of the fat  
of the  
kidneyes.

This fat about the Kidney hath a threefold use. First, it is instead of a pillow.

Secondly, it receiveth as a sponge the excrements.

Thirdly, it furthereth and keepeth in the heat.

Before you deprive the Kidneys  
of

of this *tunica adiposa* with your nailes, about the upper part of the kidney, you are to observe a large glandule, which hath a sprig from the emulgent vein and artery, for nourishment, about the middle of it.

*Renes succenturiati.*

In figure it representeth a halfe moone, and is not unlike a kidney; from whence it is called *ren succenturiatus*. There is one on each side in the upper part of the kidney, resting upon the *tunica adiposa*.

Their figure.

It is strongly tied to the *septum transversum*.

Their connexion.

The substance of it is more flaggy than that of the kidney.

It hath nerves from the *plexus retiformis*, or net-like texture, framed of the twigs of *nervus costalis* and *stomachicus*.

Their Nerves.

It seemeth to be framed, partly to fill up the vacuity which is between the kidneyes and the *diaphragma*; partly to be a pillow to the stomacke, in the place about the emulgent veine and artery.

Its use.



The proper membrane of the kidneys.

The second membrane is that which is internall and proper. This springeth from the common coat of the vessels which enter into the Kidneys: for as soon as the vessels approach to the Kidney, they leave their externall coat. It can hardly be separate from the substance of the Kidney.

Their internall parts.

The internall parts are those which are contained within the proper membrane. In these, sundry things are remarkable.

The colour of them.

First, the colour of the Kidney, which is very red.

Their substance

Secondly, the substance of the Kidney, which is thick, hard, and compact as the heart almost, but not so fibrous.

The emulgent vessels.

Thirdly, the dispersion of the emulgent vessels throughout it; first, they enter by paires into the hollow part of the Kidney; then each branch is divided into four or five lesser branches, and these again into lesser, until at the last they become capillar.

These being spread sundry wayes thorow

thorow the substance of the kidney, towards the gibbons part, at last they end at the tops of the *Caruncula papillares*, or teat-like fleshy substances, into the which they pour the serosity of the blood, that it may passe thorow the *tubuli*, or water pipes, to the *infundibulum*.

The fourth is that which is called *pelvis*, or *infundibulum*, the tunnel, which is nothing else but the ample cavity of the ureter within the kidney.

Fifthly, the *tubuli*, or *fistula ureterum*, the water pipes of the ureters offer themselves, which are most commonly in number ten; foure in each end, two being still joyned together, and two in the middle, according to the number of the *carunculi papillares*. These are placed in the arched part of the *infundibulum*. Now the ends of the pipes about the *infundibulum* are called *cribrum*, or, the sieve. These water pipes, proceeding from the *infundibulum*, become a little wider,

wider, and end in the gibbous part of the kidney, with a wide round mouth receiving the *caruncula papillares*, by the which their mouths are stopped, and the watrishnesse of the blood issueth out into them, as milk our of the teats.

Sixthly, *Caruncula papillares* are to be considered. They are small fleshy bodies, somewhat harder than the substance of the kidney, resembling the teats of womens paps, from whence they have their denomination; they are of the bignesse of a pease, somewhat broad above, below round, If you divide them through the middle, you shall perceive a smooth hairelike passage from the top to the end.

They are in number answerable to the number of the *tubuli*, which receive them.

To find out these parts before named, you must divide the kidney in the hollow part, putting a thick probe into the *pelvis*.

Incision being made to the *infundibulum*

How  
these  
parts are  
to be  
found  
out.

*fundibulum*, first you shall see the *tubuli*, then the *Caruncula papillares*.

The kidneyes have two sorts of veines.

Their  
Veins.

First, the two called *adiposæ*, because they are spread through the *tunica adiposa*, and are covered with the fat, and afford matter for the fat. The right of these springeth from the emulgent veine; but the left from the *vena cava*.

Secondly, the two *emulgentes*, so called from their action. These are large, and spring from the trunk of the *vena cava*, descending between the first and second *vertebræ* of the loynes. These being carried transversely, are implanted into the hollow part of the kidneyes, being divided into two branches.

The left is somewhat higher, as also the left kidney; but the right is somewhat longer. It hath a valve to hinder the return of the serosity to the trunk of the *cava*.

How  
matters  
gathered  
in the ca-  
vity of  
the brest  
are dis-  
charged  
into the  
Ureters.

The Ar-  
teries.

The  
nerves.

*Fallopins* was of this mind, that a branch of a veine passeth from the the *vena sine pari* to the left kidney, by the which quittour and water may be discharged by urine. But it is more probable, that these matters are first dr wne in into the trunk of the *aorta*, by its inconspicuous pores, and from thence sent to the kidneyes by the emulgent arteries.

These are in number two, one in each side which accompany the veins to the kidney slope-ways. Whither when they are come, they are divided in two branches, whereof the one is implanted in the lower, the other in the upper part of the hollow part of the kidney.

The nerves on each side spring either from *ramus stomachicus*, and that is but one and small, and is spread thorow the proper coat; from hence ariseth the consent betweene the kidneyes and the stomacke. So that vomiting is troublesome in nephriticall diseases.

One

One may think that nature hath afforded arteries larger than was requisite to afford life to so small bodies as the kidneys are; but it was fit so to be; for the passages were to be patent, which were to discharge the heart and arteries of serosity.

The artery lyeth between the veine and the ureter; partly to hasten the blood to the Kidney; partly, speedily to discharge the watriness.

The veins and arteries are not joy-  
ned with the water-pipes; for if you  
put a catheter into the ureter, by  
blowing the vessel will not swell.

The  
place of  
the arte-  
rie.

CAP. XVIII.  
*Of the Ureters.*

**T**HE Ureters, in Latin *Meatus Urinariū*, are called in Greek *ὑδηνῆες*, either from *ὑδῆς*, to piss, or *ὅτι ἔχου τῆς ὕδατος*, because they keep the urine.

Their  
number.:

Their  
substance

Their  
coats.

Its fibres

How the  
Ureter  
differeth  
from the  
Bladder.

There is one in each side.

There are white vessels, like to veines, yet they are whiter, thicker, and more nervous. They reach from the kidney to the bladder.

They have two coats, the one common, from the *peritoneum*; the other proper, from the external or common coat; it hath capillar veins and arteries.

It hath few oblique fibres, but most straight. It springeth from the bladder, for it cannot be severed from it easily, as from the kidneyes.

Yet it differeth from the bladder in two things.

First, in that the bladder hath three coats, but it only two.

Secondly, the bladder hath all sorts of fibres, but the ureter hath most straight, few oblique.

They are inserted in the backe and lower part of the bladder, not farre from the muscle sphincter, betweene the two proper coats of it, about the length of an inch:

This

This insertion is oblique to hinder the regurgitation of the urine, when the bladder is either compressed or distended with urine. Although the ureter doth not ordinarily exceed in compasse a barley corne, yet when stones doe passe, it becommeth sometimes as large as a gut.

Why the insertion is oblique.

# CAP. XIX.

## Of the Bladder.

**T**He bladder is seated in the *hypogastrium*, in the place called *pelvis*.

Its place.

Of substance it is membranous, because it was to admit large stretching.

Its substance.

The membranes of it are three. The first is from the *peritonæum*; for it is lapped within the reduplication of it.

Its membranes.

The second is thicker, and endued with many straight fibres, which *Aquapendens* will have to be



be a muscle serving for the compression of the bladder, as the sphincter serveth for constriction.

The third and innermost is white and bright, of exquisite sense, as they can witnesse who are troubled with the stone.

Its fibres  
Its crust,

It hath all sorts of fibres.

Within it is covered with a mucous crust, an excrement of the third concoction of the bladder. This doth mitigate the acrimony of the Urine.

Its perforation,

It is perforate in three parts, to wit, in the sides, where the ureters are to let in the urine, and before to let out the urine.

Its parts,

The bladder hath two parts; to wit, the bottome and the neck.

Its figure

Both these in figure represent a peare.

How it is upholden.

The bottome is upholden by the navell: First, in the middle by the ligament called *urachus*, which is the cause sometimes, that they who have a great stone in the bladder, complain of great paine about the navell.

Se-

Secondly. by the umbilicall arteries dried laterally.

If the bladder were not suspended, a man going straight up, the bottome of the bladder would compresse the neck, and cause difficulty in making water.

In man it lieth between the *os pubis* and the *intestinum rectum*. In women between the neck of the matrix and *os pubis*.

The bladder of man differeth from the bladder of beasts in two things. First, the bladder in man is couched within the reduplication of the *peritonæum*, but in beasts it is loose, and only is tied to the *intestinum rectum*.

Secondly, the bladder of man hath fat without, but the bladder of beasts none.

In it stones are promptly engendered, because the heat of it is compact: so red hot iron burneth worse than the flame of fire.

There is a great consent between the bladder and kidneyes. So that in diseases of the kidneyes, difficulty

Why mans bladder is suspended.

Its seat in Man and Woman.

How the bladder of Man differeth from the bladder of beasts.

Why stones are engendered in it.

Why there is a consent between the bladder and kidneyes.

culty in making water sometimes happeneth. The causes of this consent are two.

First, the communion of office; for both serve for the excretion of urine.

Secondly, the similitude of substance; for both the inside of the kidneyes and the bladder are membranous.

An Observation

Why the bladder in man is big.

One thing is to be noted, that a bladder is bestowed onely upon such creatures as have bloody lungs, and the hotter the lungs are, the bigger the bladder is.

So man, according to his stature, hath of all living creatures the biggest bladder; according to *Arist. lib. 1. Histor. Animal.* Because the bladder is of a cold temperature, therefore in deadly diseases of it, sleepinesse oppresseth the Patient, according to *Hippocrates, 6. Epidem.*

The muscle sphincter

In the necke onely the muscle *sphincter* doth offer it self to be considered; whereof read in the doctrine of muscles.

It hath veines and arteries called *Hipogastrica*, implanted on every side of the neck, which are immediately divided into two branches; whereof the one is bestowed upon the bottome, but the other upon the neck.

Its vessels.

It hath remarkable nerves; partly from those of the sixth conjugation, which passe by the roots of the ribs, partly from those which spring last from the *os sacrum*.

Its nerves.

The use of the bladder is to containe the urine, like a chamber-pot, untill the time of excretion come, when the bladder is full.

Its use.

CAP. XX.

*Of the generation  
of blood.*

**F**irst of all, every nourishment receiveth a preparation in the mouth. If it bee solid, it is chewed by the teeth, from the mouth by swallowing, it is turned to the stomach.

How. the  
*Chylus* is  
made.

mack. It being embraced by the stomach, and kept for a while is turned into *chylus*, partly by the specificall heat of the stomach it selfe; partly by the heat of the adjacent parts; but chiefly of the liver, spleen, and caul.

The *chylus* being made light by concoction, it riseth up, and passeth to the *pylorus*, and procureth the opening of it. This being opened, the stomach by its transverse fibres, thrusteth the *chylus* into the *duodenum*. From hence it passeth more and more downewards by degrees. The wrinkles of the small guts hinder the sudden passage of it to procure an equall concoction of all the parts of it.

In the meane time the *vena lactea* draw from the small guts, whatsoever is alimentary of the *chylus*. While the *chylus* thus passeth to the liver, and is come to the divarication of the *vena porta*, the spleen by a naturall faculty by the *ramus splenicus*, draweth to it selfe the thickest and most terrestriall part, yet

yet the purest onely may come to the liver.

When the *chylus* is come to the liver, the choler is sent either by *meatus cysticus*, to the gall, or to the *jejunum*, by *meatus hepaticus*.

The blood being perfected, the grosser part is carried by the branches of the *vena porta*, and the splenicall to the nourishment of the parts appointed for nutrition; but the purest part is carried to all other parts for their nutritiion: and because much watrishnesse is mingled with the blood, that it may passe without difficulty, by the narrow passages of inosculation, to the *vena cava*, (seeing the serosity is unapt to nourish) it is sent by the emulgent veins and arteries to the kidneys, and from thence by the ureters to the bladder.

## CAP XXI.

*Of vasa preparantia  
in Man.*

**H**itherto wee have handled the parts appointed for nutrition. Now it followeth to run thorow the parts ordained for generation to continue man-kind.

The differences  
of the  
genitals.

The genitals are of two sorts; of the male and female; and so it was requisite for procreation; for this action requireth an agent and patient: seed and menstruall blood.

The first is the palace of the plasmatick spirit. The second affordeth supply of matter to the spirit, to draw out the admirable frame of the regions and parts of the little world.

The  
parts of  
the geni-  
tals in  
man.

In man some of these parts afford matter for the seed, to wit, the foure *vasa preparantia*: some elaborate this matter, as the *corpus varicosum*: some make the seed fruitful, as the stones; some carry the  
seed

seed back againe, and make it pure, as those which are called *vasa deferentia*: some containe the seed, and an oleaginous matter, as the *vesicule seminales*, and the *prostates*; some discharge the seed into the matrix: this is done by the *penis*.

*Vasa pr. parantia*, which prepare matter for the seed, are of two sorts, veins and arteries.

*Vasa pr. parantia.*

The veins are two. The right springeth from the trunk of the *venacava*, a little under the emulgent.

The left proceedeth from the emulgent.

The Arteries.

The arteries spring from the trunk of the *aorta*; these vessels being a little distant one from another, are tied together by a thin membrane, which springeth from the *peritoneum*, and meet often by the way by inosculation. These vessels are greater in men than in women, and the arteries are bigger than the veins; because much heat and plenty of spirits are required for



for the seed. They enter into the groyne obliquely, carried together with the muscle cremaster, between the two coats of the *peritoneum*.

In curing of a rupture by incision, if the muscle cremaster doe fall out to bee bound by the ligature, *Spasmus cynicus* ensueth.

The ending of the vessels.

These vessels doe end about the beginning of the testicles, and from hence are called *emulgores*, and make up that part which is called *corpus varicosum*, *parastata*, & *plexus pampiniformis*. From the stones to it many small fibres passe.

*Corpus varicosum*

The *corpus varicosum* is framed of the twisting of the *vasa preparantia*; which maketh a long, thick, glandulous, but hard welt, without any remarkable cavity, which passeth to the bottom of the stone, and from thence to the *vas. differens*, where it endeth.

Here the venall and arteriall blood being elaborate in these admirable windings, is further prepared,

pared, a quality being imparted from the seminificall faculty of the stones.

CAP. XXII.

Of the stones.

**T**He stones in Latine are called *Testes*, because they testify one to be a man.

They are glandulous bodies, flaggie, soft, and white, without any cavity, full of small veins and arteries, such as are not in any part of the body.

They are in number two and therefore in Greeke are called *Διδυμῶν*.

Their figure is ovall, the right is hotter, and better concocteth the seed: Wherefore by *Hippocrat.* it is called *ἀρρενωγὴς*, a begetter of the male.

The left stone is more full, and hath a bigger veine; yet the seed, which is there elaborate, is more waterish,

Their substance

Their number.

Their figure.

watrish, and colder, because it proceedeth from the emulgent, and and is called of *Hippoc.* *Ἰπποκρίτης*, because it begetteth the female. In the stones there are to be considered their coats, substance, and use.

Their coats.

Their coats are foure.

First, *bursa scroti*, and it is nothing else but the skin covered with the *cuticula*: And because it cleaveth firmly to the *Membrana carnosæ* under it, so that they seem to make but one coat, it cometh to passe that in cold it doth contract it selfe, and becometh wrinkled.

The line

In the lower part it hath a line, according to the length, whereby it is divided into the right and left side; this line is called *sutura*, or a seame.

Secondly, it is called by *Rufus*, *dartos*: because it may easily bee slead from the *tunica vaginalis*: by the Ancients it was called *erithroides*, because it appeareth to be red, by reason of the fleshy fibres, where

wherewith it is enterlaced.

This ariseth from the *membrana carnosa*; which here is more thin and subtile than else where, and stored with veins and arteries.

The third is *elythroides*, or *vaginalis*; because it contains the stone as a sheath. It is a thicke and strong membrane, having many veines. In the outside it is uneven, by reason of the fibres by the which it is tied to the *dartos*; but in the inner side it is smooth. This is nothing else but the production of the *peritonaeum*.

The fourth is *ὑψηλὸς καὶ σκληρὸς* the nervous membrane, called *albuginea*, from its colour. It is white, thick, and strong, framed of the externall tunicle of the *vasa preparantia*. It is immediately wrapped in the stone; betweene these two the water is contained in *Hernia aquosa*.

The substance is described in the beginning of the Chapter. Each stone hath one muscle called *cremaster*, from *κρεμάω*, or *κρεμάζω*, which

isto hold up; because it pulleth up the stone in the act of generation, that the vessels, being slack'd, may the more readily voyd the seed.

This muscle is nothing else but the lower part of the oblique muscle, ascending neere to *os pubis*, which outwardly wrapping the production of the *peritonaeum*, is carried to the stone.

These muscles in sicknesse and old age become flaggy, and so the *scrotum* relaxeth it selfe, and the stones hang low.

The uses of the stones are three :

The first is to elaborate the seed by reason of the seminificall faculty resident in the *parenchyma* of the stones; for they turne the blood, which is brought by the *vasa preparantia*, into seed, for the most part; the rest they reserve for their own nutrition.

The second is, they add heat, strength and courage, to the body, as gelding doth manifest, by the which all these are empaired.

Thirdly,

Thirdly, they receive the superfluous humidity of the seed, by reason of their glandulous substance.

### CAP. XXIII.

*Of the Vessels that carry the seed,  
and those that keep it.*

**V***A* *deferentia*, the vessels which carry the seed; in colour they are white; in substance sinewy, having an obscure hollownes; from hence they are called *Meatus seminales*. They spring from the lower end of the *parastrata*. These mount up by the sides of the *Vasa preparantia*

When they are come within the cavity of the belly, they turn back again, and pass to the back-side of the Bladder; betweene which, and the *Intestinum rectum* they pass, untill about the neck of the bladder, being somewhat severed, and at last being joyned together, but not united, are inserted  
on

on each side in the glandulous bodies called *prostate*.

*Vesicula  
feminalis.*

Before they come thither they are joyned to the *Vesicula seminalis*. These in figure represent the cels of a Pomegranat, or honycomb.

Their  
substance

These containe an oily and yellow substance, for they draw unto themselves that which is fatty in the seed.

They are more in number, that the oleous substance should not forcibly and plentifully be poured into the *urethra*, but should gently and slowly passe from one unto another by windings, and at last be poured into the conduit of the yard by a hole which is shut up with a fleshy substance, partly to stay the involuntary effusion of it, partly to hinder the regurgitation of it. It being poured into the *urethra* chiefly in the time of carnall copulation, doth moisten it that it shrink not, and suffereth it not it to be offended by the acrimony of the seed or urine. The

*Vasa*

*Vasa deferentia* passing by these, goe to the glandules called *prostate*, by the which they are compassed.

When they are come to the *urethra*, a caruncle as a valve, is set before the orifice of each of them; partly to hinder the coming of the urine into them, partly to hinder the involuntary effusion of the seed.

Under and by this caruncle on each side there are three holes, thorow which the seed passeth into the *urethra*. These holes are discerned easily in a gonorrhea inveterate, although not so easily in a sound person.

The seed doth passe thorow these inconspicuous passages, as quick silver thorow leather, by drops. The seed having been made subtil and spirituous by sublimation thorow the *Vasa deferentia* ascending, is able to passe thorow inconspicuous passages.

*Prostate*, or *glandule seminales*, are glandulous bodies, placed be-

F

tween

The use of the caruncle in the Urethra

The holes by which the seed passeth to the Urethra.

*Prostate*



tween the neck of the bladder, and the *intestinum rectum*. Although there is no conspicuous passage by the which the seed passeth into the urethra; yet the thick membrane which wrappeth in the prostate, where it leaneth upon the urethra, is thinner, and hath many pores, which are dilated by heat in the act of generation, and may be seen in an inveterate *gonorrhea*.

A continuall dilatation of these procures an incurable *gonorrhea*.

The sphincter of the bladder compasseth these glandules. In drawing of a stone, if these parts be torne, the party becommeth barren.

*Perinaum*

Why  
these  
parts in  
men are  
hairy.

The distance between the root of the *cod* and the *podex* is called *perinaum*, because it is still moist with sweat. The *pubes*, *scrotum*, & *perinaum* in men, are furnished with haire, because glandules are placed there, which receive plenty of superfluous moisture: a part whereof

whereof they send to the skin for the generation of hair. If the seed chance to be corrupted in man, it causeth not so fearful symptomes as in a woman, because the seminary vessels are without the *hypogastrium* in man, but in women within.

Why corrupt seed is worse in a woman than in man.

CAP. XXIV.

Of the Yard.

**I**T is called in Latin *Penis à pendendo*, because it hangeth without the belly; and it is an organical part, long and round, yet somewhat flat in the upper part, seated about the lower part of *os pubis*, appointed for making of water, and conveying the seed into the Matrix.

The description of it.

It is framed of such a substance as might admit distention and relaxation.

The parts of it are either common or proper.

Its parts.

Why it  
hath no  
fat.

The cuti-  
cula and  
cutis

The  
membrana  
carnosa.

The in-  
ternall  
parts.

The two  
bodies.

The common are three, the scarf-skin, the skin, and the *membrana carnosa*.

It hath no fat, for it would have hindred the stiffness of it.

The *Cuticula* is of a reasonable thickness: the skin is somewhat flaccid, flabby, when there is no erection, but stiff when there is.

The *membrana carnosa* is somewhat sinewie.

The proper or internall parts are these: The two nervous bodies, the *septum*, the *urethra*, the glans, four muscles, and the vessels.

The two bodies are long, hard, and nervous. These within are spongi-ous, and full of black blood. The spongi-ous substance seemeth to be a net-like texture, framed of innumerable twigs of veins and arteries.

This black blood contained in these laterall Ligaments, being full of spirits waxen hot by the sting of *Venus*, doth distend the parts.

These

Their be-  
ginning.

These two laterall ligaments, where they are thick and round, spring from the lower part of the Share-bone. In their beginnings they are separate one from another, and represent the two horns of *Pythagoras* his Y, that the *Urethra* may pass between them.

*Septum  
lucidum.*

But as soon as they come to the joyning of the share-bone, they are by the *septum lucidum* everted. It is nervous and white.

It ariseth from the upper part of the commissure of the *os pubis*, and upholdeth the two laterall ligaments and the urethra, as a stay. The like is found in women to uphold the *cunius*. Under these lieth the urethra.

The ure-  
thra.

It is of a substance nervous, thick, loose, and soft, like to that of the laterall ligaments. It beginneth at the neck of the bladder, yet it doth not spring from it, but is joyned to it only, and so passeth to the glans. If you boile the bladder and it, it will separate it selfe from the bladder.

Its frame

It is framed of two membranes, the one is internall, with the which the glans is covered; it is bred of the thin membrane which covereth the nerves of the prick. It is of an exquisite feeling, that it might feel the acrimony of the seed, and cause pleasure; chiefly in that part of it which lieth between the prostates.

The externall is fleshy, and hath many fleshy transverse fibres. The middle substance is fungous, and full of black blood, that it might suffer distention and relaxation with the laterall ligaments.

At the beginning of it there are three holes, one in the middle largest, and two lesser; in each side one, from the passage which is sent from *vesicula seminales* to the urethra.

Its muscles.

The muscles are two in each side and so foure in all. Of these collaterall muscles, the one is shorter and thicker, and springeth from the *appendix*, or knob of the *coxendix*, under the beginning of the laterall

laterall ligament, and ascending obliquely, is inserted into the same, a little below the beginning of it; this serveth for erection.

The second is longer and smaller, proceeding from the sphincter of the *anus* fleshy.

This passeth straight under the urethra, and is inserted about the middle of it, in the side of the prick. These two muscles dilate the lower part of the urethra for miction and ejaculation of the seed. As the first muscle is termed *erector*, so this is called *accelerator*, or hastener.

This hath a substance agreeable with that of the *penis*; for this in erection is drawne towards its beginning, and the erection ceasing, it becommeth lank.

Glans is the extreme part; it is somewhat round, compassed with a circle, as with a Garland. It is soft, and of an exquisite feeling, by reason of the thin skin, with the which it is covered. About the

root of it: where it is joyned with the nervous bodies there is a little pit: In the which if any sharp humour be lodged, as in *gonorrhæa virulenta*, great paine is caused.

*Præputium.*

The Glans is covered with *præputium*, the fore skin; it is framed of the reduplication of the skin.

*Franum.*

The ligament by the which it is tyed to the glans in the lower part of it, is called *franum*, the bridle.

The vessels.

Of the vessels, some are cutaneous, some passe to the inner parts of *penis*.

The *Cutaneus* veines and arteries spring from the *pudenda*; these entering at the root of the prick, they passe by the sides towards the back of it, and are conspicuous enough. The vessels which bestowed upon the inner parts of *penis*, come from the *Venæ* and *arteriæ hypogastricæ*, about the roots of the laterall ligaments. Here the arteries are remarkable, which are wonderfully dispersed through the body of the *penis*: for the right artery

artery is bestowed upon the left side, and the left upon the right side.

It hath two sinews from the *Os sacrum*. The lesser is bestowed upon the skin; the largest mounting up under the share bones to the root of the yard, between the laterall ligaments; it is bestowed upon the muscles, the rest of the body of the *Penis* and the *Glans*.

Its sinews.

## Of the GENITALS in Women.

### C A P. XXV.

#### *Of the Cunnus.*

**T**HE Genitals in a Woman have four distinct parts; to wit, the *Cunnus*, the Matrix, the stones, and the spermatick vessels.

*Cunnus* is that part which offereth it self to the sight before section. In it eleven particles are remarkable.

- I. *Pubes*, that particle where

The particles of the *CUNNUS*.



the hair doth first bud out ; which ordinarily falleth out the fourteenth yeer of a womans age ; the upper part of this which buncheth out, and is most hairy, is called *Veneris mons*.

2 Is *Rima magna*, the great chink ; it beginneth at the *os pubis*, and is but an inch distant from the *anus*. Wherefore it is larger then the cavity of the neck.

3 The *Labia* or lips ; by these the internal parts are covered, as the tongue and teeth by the lips. These are framed of the common integuments of the body, these have pretty store of spongiuous fat.

4 Are the *Ala*, or *Nymphae*, the wings ; these appear when the lips are severed : These are two productions framed of a soft and spongiuous flesh, & the reduplication of the *Cutis*, placed at the side of the neck: Being joyned above, they compass the *Clitoris*. In figure and colour they resemble the comb of a Cock.

5 Is *Clytoris*, this is a nervous  
and

and hard body : within, full of a black and spongiuous matter, as the lateral ligaments of the yard. It is framed of three bodies. The two lateral are ligaments, and spring from the internal knob of the *Ischium*. The third is between these; this ariseth from the joyning of the *os pubis*; at the end of it is the glans, which hath a superficial hollownes, and is covered with a very thin skin, as a *Præputium*, which springeth from the joyning of the *Nympha*. And as it doth represent the prick of a man, so it suffereth erection, and falling; it may be called a womans prick. In some women it hath been as big as a mans.

6 Under the *Clytoris* above the neck, a hole is to be seen, by the which a woman maketh water.

7 After the *Nympha* four caruncles, resembling the leafe of the mirtle shrub, are to be seen : Whereof that which is uppermost, is largest and forked, that it might receive the end of the neck of the bladder,

bladder, the other is below: The other are on the sides. All foure keepe back the ayre, and all other things, from entring into the cavity of the neck, and by tickling the genital of man cause the greater delight. In women which have not borne children, they are most conspicuous.

These caruncles are framed of the reduplication of the fleshy neck of the genital.

8 Behinde the caruncles appeareth a cavity in the lower part of the neck of a reasonable largenesse, framed by nature to stay the seed poured into the neck from too quick slipping out.

9 In Virgins these caruncles are joyned together by a thin and sinewy membrane interlaced with small veines, cleaving orbicularly to the sides of the neck, having a small hollownesse in the middle, which will receive a pease, by the which the menstruall blood passeth: Sometimes it is hollow like a five, it is called *hymen*.

10 Behinde these caruncles and the *hymen* appeareth a chink, under the orifice of the bladder betweene the two wings, which is the entrance into the neck.

11 Now the neck is nothing else but that distance, which is between the *Cunus*, and the mouth of the matrix.

In women of an ordinary stature, it is eight inches in length.

The substance of this part is hard, without fleshy, within membranous and wrinckled, like to the inner skin of the upper jaw of a cowes mouth.

First, to cause greater pleasure in the act of generation.

Secondly, the better to retaine the seed.

Thirdly, to admit the greater dilatation in travell.

The neck is seated in that cavity of *hypogastrium*, which is called *pelvis*, betweene the bladder and *intestinum rectum*. It hath two membranes; if you cut them transversly, you shall perceive between them

The neck.

Its length.

Its substance.

Its seat.

them a spongyous flesh : such as is found in the lateral ligaments of the *Penis*. This causeth it to swell in the act of generation, innumerable sprigs of veines and arteries affording plenty of spirits.

Its vessels.

The hypogastrical veines are inserted into the neck of the Matrix : from thence passing to the mouth of the Matrix. As soon as they come to be implanted into the substance of the *uterus*, they lose their own coats, which are bestowed upon the first membrane of it. From thence by small pipes (such as are found in sponges, but wreathed) blood is carried to the Matrix; by these veines the termes issue into the neck of the genital.

A large branch passeth from *arteria hypogastrica* to the neck. A sprig of it, but wreathed, is communicate to the testicle, passing thither between the two membranes of the body of the Matrix : This sprig is winded to hinder it from ruption, when the Matrix is enlarged,

enlarged, a woman being with child.

C A P. XXVI.  
*Of the Matrix.*

**T**He matrix was appointed by Nature to be the field of Nature, to receive the seeds of man and woman, for the procreation of man, and the continuation of mankind.

It hath two parts, *os uteri*, the mouth of the Matrix, and *fundus* the bottom.

The mouth is a hole at the entrance of it, which like a mouth may be dilated, or pursed in: this entrance is but a transverse line, which when it is exactly opened becometh round.

This orifice, although in the act of generation it may be so dilated, that it will receive the glans of a mans genital; yet after conception it is so closely shut, that it will not admit the point of a bodkin; when a woman is delivered it so openeth

The parts of it.

The mouth of it.

openeth it selfe, that it maketh way for the infant, be it never so big. In those who have beene mothers, it is like to the mouth of a whelpe. The cancer of the matrix most commonly beginneth here, because it is somewhat fleshy: within this orifice a long knobby substance is placed, to helpe the shutting of the orifice the more exquisitely. About this knobby substance, small holes are to be seen, which seem to be the ends of the ejaculatory vessels.

Its figure

In figure it is like a peare or a cupping glasse.

Its bignesse.

In virgins even of big stature it exceedeth not the bigness of a walnut; But in those who are with child, it doth dilate it selfe into that capacity, as is able to containe the child.

Why it is small.

It was to be small, because the seed in quantity is but little, which it ought to embrace and cherish.

No distinct cels in it.

It hath no distinct cels, as the matrix of a beast hath; only a line, as in the tongue and cod, doth separate the right side from the left. In length

length from the orifice to the extremity of the bottome, it is thought to be three inches.

The internall superficies is rough the better to keepe the seed.

The matrix is framed of two membranes; the externall springeth from the *peritoneum*, and is the thickest of all other that spring from it. It is smooth and slippery if you except those parts where the spermatick vessels enter into the matrix, and where the ligaments goe out. The internall membrane is full of small holes, where the matrix covereth the *intestinum rectum*.

When the courses flow, they are easily seen; but not when they cease. The Ancients did take these to be the mouths of the veines and arteries.

And because they resemble in figure the measure appointed for the selling of vinegar, they called them *Acetabula* or *Coryledones*. By these holes the menstruall blood issueth.

Above at the sides of the externall membrane two little bunches, such

Its frame

*Acetabula.*

*Cornua uteri.*



such as are seen in Stirks or Heifers, when the hornes begin to bud are to be marked. They are called *cornua uteri*.

Its vessels.

Fornourishment it hath both veins and arteries.

The Veins.

Of these the veins are bigger than the arteries: the veins spring from two branches on each side: one branch commeth from the *vasa praeparantia*: this doth descend, and is spread thorow the whole matrix: but chiefly thorow the bottome: and seeing the sprigs are implanted in each side, the right are coupled with the left by inosculation.

The other branch, which commeth from *ramus hypogastricus*, doth ascend from the lower parts, and is sent partly to the orifice, partly to the bottome. These are larger than those which spring from the *vas praeparans*. Both these being dispersed thorow the substance of the matrix are united by inosculacion also.

Some will have the menstrual blood

blood to flow from the twigs sent from *Ramus hypogastricus* when a woman is with childe: being perswaded by the *Aphorisme* of Hippocrates lib. 5. *Aphor.* 51. that nothing can flow from the cavity, the orifice being so shut that it cannot admit the point of a bodkin; but the word *συνεπικλυται*, signifieth only *con-nivens*, or shut together, as the eye lids are. And although in the first moneths the orifice be exactly closed; yet when a woman is great with childe, the orifice gapeth a little, and is shut with a mucous seminall substance, which doth repell the aire, and lubricate the orifice in the delvery.

It hath arteries also, which spring from the preparing arteries, and from the *hypogastrica*, as the veines did; these accompany the veines, and are distributed as they are.

Its arteries.

The sinews first doe spring from the sixth conjugation: they are small, and are bestowed upon the bottome:

The sinews.

bottom : than from the parts which spring from the *os sacrum*.

These are bestowed partly upon the lower part of it, and partly upon the *Cunus*. These are larger, because in the act of generation great delectation is required.

By these vessels, arteries, veines, and nerves, the matrix hath a consent with all the rest of the body. And although the veines, and arteries seeme to be small in women which are not with childe: yet in those who are with child, by the affluxion of blood, they will sometimes become as thick as a finger. Yea, in such the matrix, which otherwaies is membranous, as hath beene said, becommeth in the last moneths thicker and softer; so that about the upper part of the bottom, unto the which the *placenta uteri* is tyed, it becommeth almost two inches thick.

The matrix is onely tyed to the adjacent parts laterally: for above, fore, and after, it is free; that it might

might admit dilatation, and descend or ascend in the act of generation.

Now the ligaments are in number four : The two uppermost, broad and membranous, are nothing else but productions of the *peritonæum*, which tie the matrix to the *ossa ilii*.

Its ligaments.

They are loose and soft, that they might admit dilatation with the matrix, when a woman is with childe ; and constriction when she is not.

These carry the *vasa preparantia* and *deferentia* to the matrix, and lap up the stones : they represent the wings of a bat, or the sailes of a ship spread abroad. These keep the matrix steady in its own place, that it neither ascend nor descend.

The two lower ligaments are nervous, round, and hollow; they spring from the sides of the bottom of the matrix, neer to the *vasa deferentia*, which they touch ; they goe downe to the groynes, by the production of the *peritonæum*, streng-

strengthened by the glandules : and being dilated like a membrane, they bestow one part upon the *clytoris*: the residue passeth to the knee ; in the inside of the thigh by the *membrana adiposa* : this is the cause why women after conception feeble pain in the inside of the thigh.

These ligaments serve not only to stay the matrix , but because they are hollow , by them noysome humors of the genitals are sent to the glandules of the groynes. So after impure copulation, the seminary vessels being infected , the contagious humor , by these ligaments is sent to the groynes ; from whence arise *bubones venerei*.

## CAP. XXVII.

*Of the stones, and the seminary vessels*

**W**omen have stones as men have ; but they differ

fer in eleven things.

1 In situation; for they are placed not without the *hypogastrium*, as in men; but within it: that they might bee the hotter and more fruitfull.

2 In quantity; for they are lesser.

3 In their frame; for they are composed of five or sixe bladders, which make them uneven; whereas the stones of men are smooth: these bladders containe an humidity like to whey; but it is thicker.

4 The stones of women have no *cremasters*; but are stayed by the broad laterall ligaments, called the bats wings.

5 They have no *prostates*.

6 They differ in figure; for in man they are ovall, but in women flattish.

7 They have but one membrane; whereas mens have foure.

8 In substance; for they are more soft and flaggie than in men.

The differences between the stones of a woman and of a man.

9 Intemperature; ; for they are more cold than mans stones, and containe a thin and watrish seed.

10 In women they are tyed to the sides of the *uterus*, by the two upper ligaments, which are loose and membranous.

11 In women which are not with childe, they are placed above the matrix, two inches distant from it.

Its veins

The seminary vessels preparing, are foure; two veins, and so many arteries.

The vein of the right side springeth as in man, from the trunk of the *vena cava* under the emulgent; but that of the left side springeth from the middle of the emulgent of the same side.

Its arteries.

Both the arteries spring from the descending trunk of the great artery. These veins are not united as in man, before they come to the stones, but are divided into two branches. Wherof the greater being stayed by the membranous ligament

gament, is carried to the stone; but the lesser endeth in the bottome of the matrix in the upper part, for the nutrition of the matrix, and the embryo.

These *vasa preparantia* differ from those in men in these things.

First, they are shorter than in men, by reason of the shortnesse of the passage; but they have more wreathings where they make *corpus varicosum*, about the stone, that the seed may be the better prepared.

Secondly, they passe not whole to the stones as in men; but are dividded in the mid way, as hath been said.

One thing is to be noted, thar the spermatick veins receive the arteries as they passe by the sides of the *uterus*, that the blood might be the better elaborate; for if you blow up the *vena spermatica*, both the right and left vessels of the matrix are blowne up. From hence you may perceive the communion of all the vessels of the matrix.

The difference between these and those in men.

An observation.



*Vasa de-  
ferentia.*

*Tuba Fal-  
lopiana.*

The *Vasa deferentia* spring from the lower part of the stones. They are firm, white, and nervous. They pass by the membranous ligament to the matrix, not straight, but wreathed; that the shortness of the way might be recompensed with the multitude of windings. Neer the stones they are somewhat broad: When they have marched a little, they become narrow, and about the matrix they become broad again, and end in the *cornua* and capacity of it. Amongst these vessels, the last to be considered is *Tuba Fallopiana*. *Spigelius* calleth it *Vas cæcum*, lib. 8. cap. 20. because it hath but one orifice, as the *intestinum cæcum* annexed to *colon*; this springeth from the *cornua* or bunches, and resemblesh the end of a trumpet, and passeth obliquely, over against the stone carried by the membranous ligament, and compasseth the stones: but it neither proceedeth from the stones, neither is inserted into them: And as in its beginning  
it

it is open ; so in its ending it is shut.

*Riolan* will have it to be the end of the ejaculatory vessel, ending within the matrix. He observeth, that within it is to be seen a long, white and sinewy body, which he will have to be the continuation of the ejaculatory vessel. He noteth also, that a smal sprig doth pass, but wreathed, from the ejaculatory, by the sides of the *uterus*, to the orifice ; by the which women with child spend their seed in the act of generation : which *Spigelius* denied in the citeth place, and checketh *Laurentius* for affirming such a passage.



THE SECOND  
**BOOK E;**  
 OF THE  
**BREST.**

CHAP. I.

*Of the common containing  
 parts of it.*



Itherto then of the lower belly, the seat of the natural spirit, and of the parts appointed for nutrition and procreation : Now it followeth that we handle the middle cavity, the seat of the vital spirit, which containeth those parts appointed for the cherishing of the natural heat, the distribution of the same  
 to

to all other parts of the body, and the cooling of it, if it exceed the natural degree.

This ventricle is seated in the middle between the uppermost, which is the head, and the lowermost which is the belly: for it was fit, that it should be so, that the heat passing thorow all and bestowing life, should equally be bestowed upon all the parts of the body.

It is severed from the head by the neck; from the belly by the mid-rite. It is bounded in the forepart by the breast-bone, and cartilages. In the sides by the ribs: behind by the *vertebra* of the back.

The figure of it is oval, somewhat flat before and behind, whereas in beasts it is somewhat sharp: So that onely man lieth on his back.

It is partly bony, partly fleshy, that it might admit motion, and yet not stifle the heart; the fleshy parts being suspended by the bony.

Its situation.

Its limitation.

Its figure

Its substance.

Its parts.

The fore part of it is called *sternum*, the sides *costæ*, and the hinder part *dorsum*. The parts whereof it is composed, are either containing or contained. The parts containing are either common or proper.

The common containing parts

The parts containing common are in number four, *Cuticula*, *Cutis*, *Pinguedo*, and *Membrana carnosa*.

1, 2. *Cuticula*.

The scarce skin, and skin of it do suffer from those in the belly: for it is hairy under the arm-pits, and above the pit of the heart: the skin of the back is both harder and thicker, and so is less hairy.

Secondly, the skin of the back-part is of an exquisite feeling: first, because many twigs of sinews are bestowed upon it from the *Nervis*, proceeding from the *spinalis medulla*: secondly, by reason of the muscles of the breast placed there, which have many tendons, and so are very sensible.

3. *Pinguedo*.

As for the fat, it is not plentiful here, as in the belly: first, because

cause the naturall heat here is sufficiently preserved without it: secondly, because it would have hindred the motion of the brest. Onely here it is somewhat yellowish.

The *Membrana carnosa* here in the fore part of the neck is more fleshy than in other parts, chiefly where the *musculus quadratus* is framed, which pulleth downe the checks and lips.

4 The  
*Membrana  
carnosa*.

CAP. II.  
*Of the Dugs.*

THE proper containing parts are either externall or internall. The externall are in number three, the dugs, the muscles, the bones. The internall proper containing parts are three in like manner, the *pleura*, the *mediastinum*, and the *pericardium*.

The  
parts of  
the brest.

Dugs are granted to both the sexes; in men they are framed of the *cutis*, the *membrana carnosa*,

The paps  
of men.

fat, and the nipple, and serve onely for beauty, and are called *mammilla*.

If in man a whitish substance representing milk, be found in the nipples, which hath beene scene, as witnesseth *Aristotel. 1. Histor. Animal. 12.* it is unprofitable, and unapt to nourish.

The paps in women besides these parts, have remarkable vessels, glandules and pipes, to containe the milke perfected by the glandules.

The glandules are many, not one; that the milke might be the better elaborated, there is placed above the rest one somewhat bigger under the nipple. Between these are placed innumerable veins and arteries, which receive blood from the matrix the materiall cause of milk.

When these are full of blood, the milk is made by the property of the substance of the glandulous bodies, and their temperament. The milk perfected is sent to the  
*tubuli*

The  
parts of  
the paps  
in wo-  
men.

The  
glandu-  
lous bo-  
dies.

*tubuli lactiferi* or conduits of milk, these end in the nipple.

The veins are of two sorts, for some are external, some internal. The external spring from the axillar branch, and are placed under the skin which covereth the dugs, to nourish it, and are called *Thoracica superiores*, or the uppermost breast veins. The internal or inferiour called *mammaria*, spring from the *rami subclavi*. They are in number two, whereof one doth march downward straight by the sides of the breast bone. When they are come to the *mucronata cartilago*, they pass out of the breast, and go downward by the lower part of the *musculi recti*. When they are come to the umbilical region almost, they are joyned with skin, by sundry inosculation, with the *vena epigastrica*, which meet them there.

These *vena epigastrica*, spring from the external *ramus iliacus*, and by a straight way pass upward under these muscles. From

The  
Veins.



this same branch, spring the *vena hypogastrica*, which are inserted into the neck and bottom of the Matrix.

The Arteries,

There are *arterie mammaria* in like manner, which spring from the *rami subclavii*, and get down to the navel. Whither when they are come, they are united by inosculation with the *Arteria epigastrica* ascending.

Nerves.

They have nerves from the fourth intercostal nerve, which about the middle of the rib, perforating the intercostal muscle, is divided into four branches, which are sent afterward to the pectoral muscle, the thicker passing to the nipple.

The fat.

Between these glandulous bodies and vessels plenty of fat is placed, to procure smoothness and equality to the paps. If this be wasted either by sickness or old age, the dugs become flabby.

The figure of the dugs.

The paps are of figure round, both that they should be more capable of milk, and less subject to bruising.

In

In number they are two, that if one should fail, the other should supply the defect.

Their number.

In Men, women and in Apes, which carry their young ones in their armes, they are seated in the breast.

Their situation.

1. That the mother should take pleasure by upholding the child.

2. That by the talking of the mother, the child should learn to speak, and be endued with reason.

3. That being neer to the heart, they should receive plenty of heat.

4. For beauty.

5. For convenient giving of suck; for the child cannot presently go when it is born, but must be born in the armes and applyed to the teat.

6. For the commodity of the act of generation.

7. For the defence of the vital parts.

8. For the incitation of lust.

9. To

9. To be a receptacle of excrementitious humour : So women are often troubled with Cancers.

Of the Nipple.

The nipple is placed in the middle of the dug, where the milkie conduits end. It is a round body standing out, that the infant may take hold of it with the lips. It is of a fungous substance, that it may admit distention and contraction. It hath many holes ; which appear when the milk is pressed out. It is rougher then the other parts of the dug, that the infant may the more firmly hold it. It is of an exquisite sence, that the nurse should finde some pleasure when she giveth suck. It is framed of the reduplication of the skin.

What Milk is.

Now the milk which is drawn thorow the holes of it by the infant, is nothing else but a white liquor, engendred of the venal and arterial blood, sent from the matrix, and altered by the glands of the dugs ; in taste pleasant, which is easily concocted by the stomach,

stomack, and doth speedily and plentifully nourish.

As for the muscles, they are set downe in the Treatise of Muscles, Cap. 15.

The bones, which were said to be the third proper externall containing part, are set downe in the Doctrine of bones.

### CAP. III.

*Of the proper internall  
containing parts.*

THESE are in number three, the *Pleura*, the *Mediastinum*, and the *Pericardium*.

The *Pleura* hath its denomination from the ribs, under which it is placed, and so it may be termed in English, the Costall membrane.

It is a membrane, white, thin, hard, resembling the *peritoneum*.

Its substance.

*Spigelius de human. corp. Fabr. lib. 9. cap. 3.* will have it to be thick-

er

er and stronger than the *peritonaeum*, contrary to the opinion of *Riolan*, who affirmeth the *peritonaeum* to be thicker and stronger; because it is appointed for the sustaining the weight of the guts.

Its parts.

It is everywhere double: the inner part is thickest, smoothest, and as it were bedewed with a waterish humour, that it should not hurt the lungs by its roughness: This waterish humour doth spring from the vapours raised from the blood condensed, by respective coldness of the membrane. The outer part is thinner, yet rougher; that it should cleave the more firmly to the ribs.

Its figure

As for its figure, without it is arched, within hollow: Above it is narrower, below broader, chiefly towards the sides: From it spring some finewie fibres, by the which the lungs are tyed to it. If these be too strait, the motion of the lungs is hindered, and so an uncurable difficulty of breathing procured.

Its holes

Above, it is perforate in five places,

ces, to give way to the *vena cava*, and the *aorta* ascending, the *gula*, the wind-pipe, and the nerves of the sixth paire. Below where it covereth the midriffe, it is perforate in three-places, to give way to *vena cava*, and the *aorta* descending, as also to the *gula*.

It is framed of the membranes covering the *spinalis medulla*; for those joyning with the sinews of the brest, growing broader, produce it.

It hath veins and arteries for nourishment and life; and nerves for feeling.

On each side it hath 12 veines; whereof the two uppermost spring from the higher intercostal branch, and the ten lower from the *vena sine pari*.

So many arteries are in like manner; whereof the four uppermost proceed from the superior intercostal; and the inferior eight from the hinder part of the *aorta*, descending.

It hath twelve nerves in like manner;

Its beginning.

Its vessels.

Its veins.

Its arteries.

Its nerves

manner ; whereof the four branches which spring from the *vertebra* of the brest, are bestowed upon the forepart ; but the hindermost branches are bestowed upon the muscles, which are placed upon the back.

The seat  
of the  
vessels  
and the  
plurific.

Its uses.

These vessels are placed between the duplication of the *Pleura*, and the plurific it self is not seated in this place onely, but between the *Pleura* also, and the intercostal muscles. It hath two uses : First, to wrap in all the vital parts. Secondly, to defend them from all external injuries.

Of the  
*Mediasti-*  
*num*.

The second membrane is the *Mediastinum* ; because it standeth in the middle of the brest, and divideth the right side from the left.

It hath not onely a duplication as the *Pleura* hath, but is double also ; for one is in the right side, the other in the left. They are united according to the longitude of the *vertebr.* of the back ; but severed towards the *sternum*.

In

In the cavity between these parts of the *Mediastinum*, one may be deeply wounded, without any great danger of death. Such a wound you shall easily discern; First if small store of blood issue out. Secondly, if no breath come out.

Observation

This cavity is seen when the *Cartilago xiphoides* is removed. In the dropse of the lungs, and when corrupt matter is gathered, the *sternum* here may be tripaned.

The substance of it is membranous, yet thinner and softer than the *Pleura*. The inner side towards the lungs is smooth, and hath fat about the vessels; but the exterior is rougher, by reason of the fibres, by the which it is tyed to the *Pleura*.

Its substance.

It reacheth from the throat to the midriffe.

Its largesse.

As for its vessels, veins and arteries, it hath from those called *mammariæ*, but small, and from *vena sine pari*.

Its veins.  
Its arteries.

It hath one speciall veine called  
*media-*



Its nerves

*mediastina*, which springeth from the lower part of *ramus subclavius*.

The nerves called *stomachici*, passe by the reduplication of it. It hath three uses: First, it divideth the brest and lungs in two parts, that one being wounded, the other should be safe.

Secondly, it holdeth up the *pericardium* firmly, wherein the heart is contained, that it should not rest upon the back bone, when we lie upon our back; or that it should fall upon the brest bone when we bend our selves towards the ground; or touch the ribs when we lye upon our sides.

Thirdly, it giveth a safe passage to the vessels which passe by it.

Of the *pericardium*.

The third proper containing part is the *pericardium*, so called because it compasseth the whole heart, whose figure it hath, for it is pyramidall. It is so farre distant from the heart, as is sufficient to give way to the motion of the same, and the containing of the waterish humour.

It

It hath two membranes: 1. Outer, from the *mediastinum*, it is tied before and behinde to the *pleura*; from whence both the *mediastinum* and *pericardium* originally spring. 2. Inner, proceeding from the external tunics of the vessels of the heart: for within the *pericardium* the vessels lack their common tunicle, it having been spent upon the *pericardium*.

The external membrane is fibrous; but the internal is slippery, but firm and thick. The motion of it is secondary from the heart.

It leaneth more to the left side then to the right, and more to the fore then back part. It cleaveth so firmly to the nervous circle of the midriffe, that it cannot be separate from it without rending, to direct the motion of the heart.

It is perforate in five places. In two, for the entring in and passing out of the *venacava*. In three for *vena arteriosa*, and *arteria venosa*, and the passing out of the *aorta*.

Its membranes.  
Its connexion.  
Its beginning.

Its situation.

Its holes

It

Its  
vessels.

It hath small veines from the *phrenice*, and the axillar. No arteries appear because it is neer enough to the heart.

Its uses.

It hath two uses : First, to keep the heart in its own place, whether we bend our bodie backward, forward, or to either side.

Secondly, to contain the waterish humour, which is sundry wayes profitable : for first it tempereth the heat of the heart : Secondly, it moisteneth the same. Thirdly, it maketh it slippery : Last of all the *pericardium* defendeth the heart as an armour from all external injuries.

The wa-  
terish hu-  
mour in  
the *peri-  
cardium*.

The waterish humour which is contained in the *pericardium*, is like urine, yet not sharp or saltish. If it be thick and slimy, it causeth the heart to be hairy. If it be too copious, it causeth the panting of the heart, which is cured by phlebotomy. It is too plentiful in those who have obstructions of the mesaraical veines, liver, or spleen : for in such the thinnest part of the *chylus* onely

ly is drawn for nourishment, and so the blood becometh warrish.

Some think it to proceed from a seminal aquosity, even from the first generation: as the air within the eares is from a flatuous. Others think that it is ingendred of vapors raised from the blood, and waterishness of the veines and arteries of the heart, and condensed by the respective coldness of the membrane, and by this means the *peritoneum* and the *pleura* seem always bedewed with moisture.

It seemeth that the first beginning of it is a seminal humidity, and that is maintained afterward by the vapors.

Sometimes also there is contained in the capacity of the brest, a bloody water to mousten, and temper the heat of the lungs.

It is caused partly of the vapours raised from the vessels, partly of that portion of drink, which passeth to the lungs: and by reason of this water, and blood did flow from the side of our Saviour pierced.

Its generation.

The bloody water in the capacity of the brest

## CAP. IV.

*Of the trunk ascending from  
the Vena Cava.*

**N**ow the parts contained in the brest, are either *vasa* or *viscera*, the vessels or the entrals.

The vessels are in number four, the *vena cava*, the *vena arterialis*, the *arteria venosa*, and the *aorta* or *arteria magna*.

The *vena cava*.

The first is the *vena cava*, or *magna*, because the hollownes of it is great. It hath its beginning from the liver. The orifice of it is three times as large as that of the *aorta*: being received by the right ear of the heart, it is expanded into the whole right venticle of the same.

Its valvs.

About the orifice of it are placed three valves called *trifurca* or *tricuspides*: because arising from a large foot, they end into a narrow top representing barbed arrowes.

Their situation is from without inward, so that the blood may be let

let in, but not returne. They proceed from a membranous circle, annexed to the orifice: They cleave to the *septum* of the heart; towards the point of it be strong fibres ending in round caruncles.

If you would see these as the rest of the valves, cut transversly the ventricles of the heart neer to the *basis*, and then they will appeare.

It hath two trunkes, one descending, and this is that which is caused of a number of small veines, appearing in the hollow part of the liver, which meet about the middle of it in one trunk still decreasing in number, and encreasing in bignesse.

The  
trunk de-  
scending

The other ascending; this is procured by a number of small veins, springing from the convex part of the liver, which end in like manner into one trunk about the middle of it.

The  
trunk a-  
scending

This is bigger than the descending because all the upper parts are fed by this onely; whereas most of the

The lateral  
sprigs  
of the  
trunk as-  
cending.  
1 Phrenica

the parts contained in the abdomen, are nourished by the *vena porta*.

Although it be not divided into branches untill it come to the throat, yet it doth send forth sundry sprigs from the sides.

The first is called *phrenica*, one in each side. It is inserted into the *diaphragma*, which is called *σπέρμα*, by a number of twigs, and from thence it bestoweth twigs upon the *pericardium* and *mediastinum*.

The second is called *Coronaria*, so called because like a garland it compasseth the *basis* of the heart. It sendeth sundry twigs to the outer parts of the heart; but chiefly to the left: because it needeth greater store of nourishment, by reason of its stronger motion.

This hath a valve which hindereth the returne of the blood, to the *vena cava*. This springeth from the *cava*, before it enter into the heart, and the blood is somewhat thick, and not attenuate in the ventricles of the heart; for the substance

substance of the heart, being hard and firme, was to be nourished by blood somewhat grosse.

The third is called *ἀζυγος*, or *sine pari*, without a mate; because it hath not a fellow as other veines have in the leftside, if you except those beasts which chew the cud.

3. Vena  
*sine pari.*

This springeth from the *cava*, as soone as it is come out of the *pericardium*. It passeth out of the hinder and right part of the *vena cava*, about the fifth *vertebra* of the brest. It doth not descend straight way : But comming a little forward, it returneth towards the *spina*.

When it is come to the eighth or ninth rib above the *spina*, it is divided into two branches, to wit, the right and the left ; Then passing by the division of the mid-riste, which is between the two productions of it, they are spred thorow the abdomen. Of these two, the left is inserted into the left emulgent.



By which  
way mat-  
ters in  
the brest  
are dis-  
charged.

By this way *Fallopins* will have wa-  
trish, purulent and bloody substances  
to be discharged, which sometimes  
are contained in the brest, while these  
branches march downward: In each  
side ten sprigs bud out, which march  
thorow so many distances of so many  
of the inferior ribs.

In the lower part of the rib,  
there is a groop to receive the sprig.  
Wherefore when you make inci-  
sion in an *empyema*, come not neer  
to this part. From this veine other  
small twigs also proceed; which  
afford nourishment to the *spinalis  
medulla*.

These are called *costales inferio-  
res*, or the lower intercostals. The  
*vena sine pari* thus being framed,  
the *cava* ascendeth to the *jugulum*,  
strengthened by the *mediastinum*  
and the *thymus*; which is placed in  
the uppermost part of the brest.

Here the *vena cava* is parted into  
two remarkable branches: From  
whence all those veins spring, which  
are sent either to the head or armes.

One

The di-  
varicati-  
on of the  
*Vena cava*

One branch marcheth to the right, another to the left side: while they remain within the brest, they are called *subclavii*, because they march under the cannel bones; but when they are come to the arm-pits, they are called *axillares*.

Before they come to the arm-pit, sundry sprigs spring from them.

The first is *intercostalis superior*, this ariseth from the root of the di-  
varication; and passing by the root of two ribs bestoweth twigs upon the distances of the two upper ribs, as the *vena sine pari* did: there is one in each side.

The second is called *mammaria*; this marcheth forwards towards the upper part of the bone of the brest. From thence it goeth down by the sides of it: and when it is come to the *cartilago mucronata*, about the sides of it, it passeth out of the brest, and marcheth by a straight way under the straight muscles to the navil, where it is joyned with the *vena epigastica*  
H 2 ascen-

Sprigs proceeding from the *Cava* within the brest.  
1. *Intercostalis superior*.

2. *Mammaria*.

*ascendens* by inosculation : which is the cause of that great consent, which is between the paps and the matrix. This before it leave the brest, it bestoweth one branch upon the cartilaginous distances of seven of the *costæ veræ*, where the sprigs of the *vena sine pari* end. From these branches proceed some other remarkable twigs, which are bestowed upon those muscles, which are seated upon the brest, and the dugs.

3. *Mediastina.*

The third is called *Mediastina*, because it is bestowed upon the *mediastinum* together with the left nerve of the midriffe, according to the length of it.

4. *Cervicalis.*

The fourth is called *Cervicalis* or *vertebralis*. It is large in each side, marching upwards obliquely towards the back part, it commeth to the transverse processes of the *vertebrae* of the neck, where passing thorow the holes of them, it bestoweth branches upon the muscles which lie above the *vertebrae*.

The fifth is called *Muscula inferior*, because it is spent upon the lower muscles of the neck, which stretch out the neck and head.

5. *Muscula inferior*

The sixth is the internal jugular; this ariseth where the cancell bone is articulate with the *sternum*. This joyned with the nerve recurrent, and the soporal artery, marcheth by the side of the winde-pipe, to the throat.

6. The internal jugular.

The seventh is the external jugular; this marching up under the skin, and the quadrat muscle, which pulleth down the cheeks, commeth to the ear. This in beasts is bigger then the internal, otherwise then it is in man.

The externall jugular.

## C A P. V.

*Of Vena arterialis, and arteria venalis.*

**T**He second vessel in the brest is *Vena arterialis*. It is a veine from its office: for it carrieth

*Vena arterialis.*

natural blood to the lungs by the right side of the winde-pipe: It is called an artery, because the coat of it is double, not single as that of veines. It doth spring from the upper part of the right ventricle of the heart, and is implanted into the substance of the lungs by the right side of the winde-pipe.

*Arteria  
venalis.*

The third vessel is *arteria venalis*. It is called an artery, because it carrieth arterial blood; but a veine, because it hath a single coat as a veine. It ariseth from the upper part of the left ventricle of the heart, and is implanted into the substance of the lungs by the left side of the winde-pipe.

The  
valves of  
these two  
vessels.

The *Vena arterialis* hath three valves called *Sigmoides*, from the figure of the great *sigma*, which answereth the Latin S. the figure is this C. They look from within outwards, to let out the blood; but to hinder the return of the same.

The *Arteria venalis* hath two valves called *mitrales*, because they  
are

are like a Bishops Miter. They look from without inward, to let in blood carried from the *vena arterialis*. They are bigger than those of *vena cava*; and have longer filaments, and to strengthen them many fleshy snippets are joyned to them.

It hath two valves only, that the fuliginous vapours might the more readily be discharged.

It hath also but a single thin coat, partly for the same purpose, partly because the blood sent from the *vena arteriosa* is cooled by the *bronchia* of the lungs, before it entereth into *arteria venalis*: it needeth not so thick a coat as an artery; and because veins only carry in blood, and arteries carry out, Therefore *arteria venalis* is placed in the left ventricle, and *vena arterialis* in the right. Both these vessels not far from their beginning, are divided into two branches, whereof the one passeth to the right part of the lungs, and the other to the left; and each of these is subdivided into other

branches, untill at the last they end in small threds.

The greater branches accompany one another, so that the veine still marcheth with the *arterie* joyned together by many inosculationes or *anastomoses*.

Between them the branches of *aspera arteria* march. These vessels are great, because the lungs by reason of their perpetuall motion require much nourishment.

First, the blood is carried into the lungs by *vena arterialis*, and from hence to *arterea venalis*, by sundry *anastomoses*, and from hence to the left ventricle of the heart. Where being made spirituous, it is sent by the *aorta*, to impart life to the whole body.

One thing is to be noted, that no air in its proper substance is carried to the heart: for the blood contained in these two vessels, is sufficiently cooled by the *bronchia* passing between them.

The blood is cooled. First, by staying in the lungs while it is in passing.

Se-

How the blood is carried to the left ventricle of the heart.

How the blood is cooled.

Secondly, by touching the *bronchia* cooled by the attraction of fresh air: And thirdly, by the continual motion of the lungs.

One thing is to be noted, That in *arteria venosa* a little below the valves there is found a little valve ever open. It being removed, there appeareth a hole, by the which the blood passeth freely from the *vena cava* to it, and returneth by reason of this *anastomosis*; that the blood in the veins may be animate.

## CAP. VI.

*Of the great arteries, and first of the trunk ascending of the same.*

**T**He fourth vessel is the great artery called *aorta*; because it receiveth the air. It springeth from the upper part of the left venticle of the heart, where it is largest and hardest.

Before it come out of the *Peri-*

H 5

*cardium*

*Coronarie  
arteria.*



*cardium*, it sendeth two small twigs, from each side one: which compass the *basis* of the heart, like a garland, and send down according to the length of the heart other twigs: These are called *Coronarie*. These twigs are more in number, and larger about the left ventricle then the right, because it requireth greater plenty of nourishment, by reason of its stronger motion, which digesteth much blood.

The situation of the *aorta*.

Its trunks.

It is placed between the windpipe and the *venacava*, tied to the mouth of the stomach, passing under the trunk of *vena arteriosa* upward: when it hath pierced the *Pericardium*, it is divided into two trunks; whereof the one is called *truncus ascendens*, the ascending trunk: The other *descendens*, the descending.

Of these two the descending is largest, because it ministereth life to more parts.

The branches of the trunk ascending

This ascending trunk before it passes to the armes, is divided into two

two branches, whereof one passeth to the right; the other towards the left arme; they are called *subclaviarum*, because they march under the canell bones. When they are gone out of the brest, they are called *Axillares*. From both the lower and upper part of both these branches, sundry sprigs doe spring.

From the upper part proceedeth *intercostalis superior*, which bestoweth twigs upon the distances of the uppermost foure ribs. From whence others are sent to the adjacent muscles, and the *spinalis medulla*.

From  
the upper  
part.

From the lower springeth that branch, which is called *Cervicalis*, but more fitly *Vertebralis*; for it springeth behinde where the *vertebra*; from thence marching upwards it bestoweth twigs upon the *spinalis medulla*, which enter by the passages, by the which the nerves, as also upon the muscles, which are placed in the hinder part of the necke, and at the last ente-

From  
the lower  
part.

entereth into the *Cranium*, by that hole, by the which the *spinalis medulla* descendeth from the braine.

This with its fellow when it is come to the cell of the wedg-like bone on each side of it, between the first and second pair of sinewes, having been divided, causes *Plexus coroides*.

2. The second, the *Arteria mammaria*, which accompanying the *Vena mammaria*, is joyned with the *epigastrica arteria*, ascending by inosculation about the navell.

3. The third is that called *Muscula*, and is distributed upon the muscles of the neck.

4. The fourth is the Soporall, one on each side; so called, because if they be stopped, sleep doth immediately follow.

These soporall arteries when they are come to the throat, they are divided into two branches, to wit, the externall, which is lesser, and the internall which is larger.

The externall bestowes twigs upon the muscles of the face, upon the roots of all the teeth of the lower jaw, having entered into the cavity of the mandible, and going out upon the chin.

The internall branch when about the throat, it hath bestowed twigs upon the tongue and larynx, about the lower part of the skull, it is divided into two branches; whereof the lesser and hinmost accompanying the branch of the internall jugular marcheth toward the hindermost part of the skull, and entering at the second hole of the nowle entereth into the hollownesse of the *Dura mater*.

The formost and largest, when it hath entered into the cavity of the skull, thorow its proper hole in the parietall bone, and is come to the cell of the wedge-like bone, it maketh *rete mirabile*; which in beasts is large, but in man very obscure.

## CAP. VII.

*Of the descending trunk of the Aorta.*

**T**HE descending Trunk of the *aorta* about the fifth *vertebra* of the breast bending towards the left side, marcheth downwards towards the last *vertebra* of the loynes.

In this march it sendeth forth sundry branches, which are these:

1. *Intercostall inferior arteries* in number eight. 2. *Phrenica* two, 3. *Cœliaca* one. 4. *Mesenterica superior*. 5. *Emulgentes* two. 6. *Spermatice* two. 7. *Mesenterica inferior*. 8. *Lumbares*.

The inferior intercostall arteries, accompanying the veines and nerves of the same denomination march according to the length of the lower part of the ribs, where there is a hollownesse to receive them, and in the true ribs end, where the cartilages begin; but in the

The branches of the trunk descending

1. The inferior intercostals.

the short ribs they go a little further, even to the sides of the lower belly.

These send sprigs by the holes of the nerves to the marrow of the back, and to the muscles which rest upon the *vertebra* of the back.

These not onely afford spirits and blood, to the intercostal muscles; but carry also quittour and water gathered in the cavity of the brest, sent by the trunk of the *aorta* to the bladder, by the emulgent arteries, according to *Spigelius lib. 6. cap. 4.* whereas *Fallopins* will have these matters to be sent by *vena sine pari*; but this is a shorter way.

*Phrenica* are two, one on each side: they spring from the trunk as soon as it is come out of the cavity of the brest, and being spread into many twigs, whereof the most are bestowed upon the lower part of the midriff, where the *vertebra* of the back are; and some also upon the upper part, which afterward

By what way quittour and water is sent from the brest to the bladder.

2. *Phrenica.*

ward pass to the *pericardium* where it cleaveth to the midriffe.

3. *Cœliaca*

*Cœliaca* is one, so called, because it sendeth twigs to the stomach. This springeth from the fore-part of the trunk. This bestoweth branches upon the stomach, liver, gall, caule, the *duodenum*, the beginning of the *jejunum*, to a part of *Colon*, to the *Pancreas*, and spleen.

4.

*Mesenterica superior* doth arise a little below the *cœliaca*, accompanying the *vena meseraica*. It bestoweth many twigs upon the hungry and *Ilium* gut; as also upon that part of *Colon* which lieth between the hollow part of the liver, and the right kidney. So that this branch is bestowed upon the upper part of the mesentery.

5.

The emulgent arteries are two, the right and the left. They spring from both the sides of the trunk under the former, where the first and second *vertebræ* of the loyns are coupled by a ligament. The left is lower then the right. These when

when they are come to the kidneys, are divided into two branches, which are inserted into the cavities of the kidneyes, and by innumerable small twigs are spent upon the substance of the kidney. The use of these, besides the common, is to discharge the serosity of the arteries, whereof they have great store.

*Spermatica*, or *seminales*, the Seminary ; they are in like manner two, which spring from the forepart of the trunk.

The left artery doth not spring from the left emulgent artery as the veine doth. These marching downward, accompany the veins of their side. In men they are carried to the stones by the productions of the *peritonæum* ; but in women when they are come neer to the stones, they are divided in two branches ; whereof the one is bestowed upon the stones, and the other upon the bottome of the matrix, in the side of it.

*Mesenterica inferior*, it springeth about

6.

7.



about the *os sacrum*, from the trunk a little above, before it sendeth forth the *rami iliaci*. It is bestowed upon the left part of the *Colon*, and the *rectum*; and accompanieth the Hemorrhoidicall veines to the *anus*.

*Lumbares rami*, the Loynne branches, in number foure : They spring from the backe part of the descending trunk of the *aorta*. These passe to the *vertebra* of the loynes, and their marrow by their holes, as also to the adjacent muscles. Some things here offer themselves to be observed.

1. That when either the colicke is changed into the gout, or contrarywise the gout into the colick; if the last happen, then the humors are sent from the crurall arteries to the trunk, and from thence to the mesentericall branches of the arteries; and from thence to the guts. If the first happen, then the humours passe the contrary way.

Read *Hip. 6. Epid. Sect. 4.*

2. If the colicke turne either  
to

to a palsey, or falling sickness, as it may fall out, according to *Aginet. lib. 3. cap. 43.* then the humour doth return from the *Colon* by the mesenterical arteries, to the trunk; and from hence to the *Lumbares*, which being filled compress the adjacent nerves: from whence difficulty of going ensueth; which may be called an imperfect palsey. If the falling sickness be procured, the humour is sent to the groyn-arteries, and thence to the brain.

3. Clysters may purge the whole body: for the clyster moistning the whole *Colon*, may by the twigs of the arteries draw noisome humours from the trunk, and when purgation is caused by anointing the navil (which often falleth out in using the unction for the pox) or vomiting by ministring a clyster, wherein white Hellebore is, first the arteries draw the force of the medicaments, and this same faculty again doth purge by the arteries.

9.

9. *Arteria sacra*, or those branches which go to the *os sacrum*. They spring from the lower part of the trunk, before it sendeth out the *rami iliaci*. They are somewhat large. They marching downward, and leaning upon the *os sacrum*, enter into the holes of it, and so pass to the marrow, and hinder part of the same. By these the matter which causeth the cholick may pass to procure the palsey of the legs.

10.

*Iliaca arteria*, these arising below the former, about the lower *vertebra* of the loyns, mount above the veine, least it should be hurt by the hardness of the *os sacrum*, in their continual motion.

They being in number two large branches, called *Arteria iliace*, or flank arteries, and marching downward to the thigh obliquely they represent the Greek  $\lambda$  inverted. These a little below the division of the trunk are subdivided into two branches, to wit, the internal

ternal or lesser *Iliaca*, and the external or greater.

The internal hath two branches ; The one is called *Glutea*, and with a vein of the same denomination , is bestowed upon the muscles which make up the buttocks : The other is called *Hypogastrica*.

This is large ; this being carried directly to the lower part of the *os sacrum* , in men it bestoweth twigs to the bottom and neck of the bladder , and to the straight Gut ; but in women wherein it is larger , it sendeth plenty of twigs upon the bottom and neck of the matrix besides the former parts. The external or greater hath two branches.

The first is called *Epigastrica*. It springeth from the outter part of the artery a little before it pass thorow the *Peritoneum* ; and turning upwards it mounteth upwards by the inner side of the straight muscle of the belly : and about the navil it is inosculate  
with

with the *arteria* descending.

The second is called *Pudenda* : This is but a small branch, and when it is come out of the *peritonæum*, it passeth obliquely by the joyning of the *os pubis*, and is bestowed upon the skin of the secret parts.

A note.

One thing is to be noted, that the *Arteria umbilicalis* springeth from the internal *iliaca*; and going along the great artery, is firmly tied to the bladder by strong membranes.

When the child is in the belly, it is hollow; but without hollowness when the infant is born.

The  
Valves.

About the orifice of these vessels, eleven valves are to be seen if the ventricles of the heart be dissected transverse neer to the *basis*. Of these some are called *trisulca*, and resemble a barbed arrow; some *Semilunares*, or *Sigmoides*, because they resemble a half moon, or the Greek letter called C. Those bend inwards. because they are set before the vessels which carry in blood.

They

They bend outward, because they are appointed for the vessels which carry out the blood.

The *Vena cava* hath three *Trisulca*; but the *Arteria venosa* two.

The *Aorta*, and *vena arteriosa* have three *Sigmoides*.

# CAP. VIII.

*Of the hearts similiary external parts.*

**H**itherto of the vessels of the brest: Now follow the entrals, which are the heart and lungs. The heart in Latin is called *cor*, from the Greek word *καρδία*, from *καρτιά*; so called, by reason of the sovereignty which it hath above other parts of the body; or from *καρδία*, which is derived from *καρδιασμεναι*, because it is tossed with continual motion: of figure it is *pyramidal*. The Ancients likenend it to a Pine Apple.

Its appellation

Its figure

As

Its bigness.

As concerning its bignesse, it is larger in man than in beasts, if you consider the stature of his body. The externall superficies of it is smooth, but within it is unquall, and hath many fibres.

Its substance.

The substance o it is fleshy, red, and compact. It is sixe inches in length, and foure in bredth. It is tyed above to the *mediastinum*, below to the *diaphragma*, by meanes of the *pericardium*.

Its connexion.

Its parts.

The parts of it are either dissimilary, or similary.

Its dissimilary parts.

The dissimilary are two, to wit, *Basis*, or the head, which is round and broad, and *mucor*, or *apex*, the small point, which doth bend towards the left side, and forwards under the left pap, where one may feel the motion of the heart.

The similary.  
External  
I.

The fat.

The similary parts are either externall, or internall. The externall are foure; to wit, the fat, the membrane which covereth it, its vessels, and the eares. The fat is more copious in man than in beasts

beasts, chiefly in the upper part, where the vessels pass out.

The membrane with the which the heart is covered, is thin, and cannot be separated from it. The vein whereby it is nourished is called *Coronaria*; because in figure it is like to the Crowns of the ancient Kings; for it compasseth the *basis* of the heart round about, and from thence sendeth branches to the whole substance of it, even to the point of it. In the right side they are fewer and lesser; but in the left, thicker and larger. This vein springeth from the ascending trunk of *vena cava*, a little before it entereth into the right ventricle.

*Arteria Coronaria* compasseth the *basis* of the heart, as the veins doth, and sendeth sprigs to the whole heart, but chiefly to the left side. It springeth from the beginning of the *aorta*, before it pass thorow the *pericardium*.

It hath nerves from the sixth conjugation, but small; bestowed upon the

The  
mem-  
brane.  
The vein

The Ar-  
terie.

Nerves.



*basis* neer the *vena arteriosa*.

The ears

The last external part are the ears, both because they are like to the ears of a dog, and are fastned to each side of the heart, as ears are to the head. Their substance is nervous: they have three sorts of *fibres*, and are not much thicker then the skin. In figure they are pyramidal, somewhat sharp at the top: they are unequal both without, and within; yet they being full of blood, the external superficies seemeth smooth. In number they are two; the right which is seated before the orifice of the *venacava*, and the left seated before the *arteria venalis*. They differ; for first, the right is largest; secondly, the left is harder, more fleshy, and thicker: thirdly, the left is more pointed, and broad. The motion is contrary to that of the heart; for when the heart is dilated, they are contracted to expel, and contrariwise. The blood is first of all received and stayed in these ears, and for two reasons

reasons. First, that the whole heart should not be too much stretched by the influx of blood, and so the dilatation and constriction of it hindered; as we see in a bladder too much filled with water. Secondly, that the vessels would not burst; and so when the heart is dilated, they are contracted; and softly poner in the blood. They are two, because there be two vessels which carry in blood to the heart, to wit, *vena cava*, and *arteria venosa*; and because the *cava* is larger then the *arteria venosa*.

The substance of the eares is nervous, because they were to admit dilatation and constriction, The veines hath a semilunary valve to hinder the reflux of the blood, when the heart is contracted. The fat about the heart moystneth it; and yet is not melted by the heat therof, because it is suet, and not grease.

## CAP. IX.

*Of the similiary internal parts.*

**T**He internal parts of the heart are the two ventricles, the right and the left, and the *Septum*.

Of the  
Ventricles.

How the  
Ventricles differ.

The ventricles do differ in these points. 1. in bigness ; so the right is much bigger then the left ; for it reacheth from the *basis* to the *mu-  
cro*. 2. In the blood contained ; for the blood in the right ventricle is venal , but in the left arterial. 3. In figure ; for the right is semi-circular , but the left orbicular. 4. The left ventricle is placed exactly in the middle of the heart : for the right seems onely to be an appendix set onely to the side. 5. The left ventricle is of a more solid and compact substance , and is three times thicker then the right. 6. The right ventricle was appointed by nature to minister nourishment to the lungs ; but the  
left

left to be a store-house of vitall blood whereby it is communicate to the whole body. If you dissect the heart according to the longitude from the *basis* to the point, you shall finde the internall superficies very unequall, full as it were, of pits; yet the left ventricle is most unequall. In both these ventricles you may note some fleshy fibres springing from the *mucro* of the ventricles, which becoming membranous fibres are inserted into the lower parts of the valves. There are five in the right, but in the left two only, yet more thick and solid.

The action of the heart is called *pulsation*. The cause of this is a peculiar faculty granted to the heart, flowing from the forme of it. The pulsation hath two motions, dilatation and constriction.

In dilatation the *mucro* is drawn to the *basis*; for so it becometh sphericall and more capable. In this motion it draweth blood to it selfe from the trunke of the

The  
action of  
the heart

Dilata-  
tion.

*venacava*. This motion is performed when the straight fibres are contracted, and the transverse relaxed.

Constriction.

In constriction the *micro* do fall from the *basis*, and so the heart becommeth narrower. By this motion the vitall blood is expelled out of the heart. This motion is performed by the constriction of the transverse fibres. Between these contrary motions we must imagine some rest.

The *Septum*.

These ventricles are divided by the *septum*, which is nothing else but the right wall of the left ventricle; wherefore the right side is bunched, but the left hollow. It is unequall as the ventricles. The pits are not permeable, and so no blood can passe through the *septum*, from the right to the left ventricle.

*Fig. IV.*



## CAP. X.

Of the frame of the  
Lungs.

**T**He second entral of the brest, to wit the Lungs follow, called Latin *Pulmo*, and in Greek *πνεύμων*; because they are the instruments of breathing: we are to consider their frame and action.

As concerning their frame, these things are to be marked. 1. The substance. In a man it is of the colour of Rose, spongiouse and light, so that it swimmeth in water: but in a child in the womb it is redder, harder, and heavier, and doth sink in water; because it is fed with venal blood, derived from the *vena cava* to *arteria venosa*, by *anastomasis*.

2. The Lobes, they are ordinarily two, sometimes three. If there be two, the upper is shorter then the lower. They cleave together

Its substance.

Its lobes

by membranous ty es: they are like to the horn of an Ox; for towards the brest they are bunches, but towards the back hollow.

Its mem-  
brane.

The lungs are covered with a membrane. It is framed of the common coat of the vessels, which are bestowed upon the lungs. It is thin, soft, and very porous, to give way to noisome matters, which sometimes are carried to the *aspera arteria*, to be voided by spitting.

Its ves-  
sels.

3. As for its vessels; veins it hath from the *vena arterialis*, which passeth out of the right ventricle of the heart. Arteries it hath from the *arteria venosa*. The first bestow nourishment, the second, life. As soon as they touch the lungs, they are divided into two branches, and those into more, until at last they end into thred-like twists. It is fed neither by the *venacava*, nor *porte*; because the blood contained in these is too gross; for they require for nourishment a blood, between venal and



and arteriall, which is not seen in any other part of the body. The blood is carried from the right ventricle of the heart, from the *vena arterialis* to the *arteria venalis*. And so the hot blood of the left ventricle is cooled; as the meane boyling of a pot is stayed by powring in some cold water. It hath a small nerve from the sixth conjugation, which goeth no further then the membrane, which affordeth but a dull feeling.

The cooling of the blood of the heart

4. The wind-pipe remarkable is Latine *aspera arteria*. It is called an artery, because it receiveth in the aire by inspiration: *aspera*, because its substance is unequall.

The Winde-pipe. Its denomination

It may be thus described: It is a long pipe framed of round cartilages, tyed together by membranes, ever open, which beginning at the lower part of the throat, and resting upon the mouth of the stomach, is implanted into the lungs by many branches. It hath two parts; the upper,

Its description

Its parts

The *rima*

which is called *larynx*; and the lower, which is called *branchus*. In the upper part there is a chinke that the aire passing thorough a narrow passage might cause a sound. The instruments of the voice are moystned by the glandules, to cause the cleerer sound.

Its frame

The winde-pipe is not altogether cartilaginous ; for so it could not have been dilated ; nor altogether membranous, for then it would have shrunk together: whereof the cartilages are tyed together by membranes. These cartilages are like to the Greek C. The winde-pipe then beginning under the annular cartilage of the *larynx*, it passeth downward straight waies, becoming by degrees smaller ; it cleaveth by a membrane to the mouth of the stomach : and about the fourth *vertebra* of the brest, it is divided into two branches, the right and the left, which enter into those sides of the lungs ; and so the branches encrease and grow lesser, untill at the

the last they end by small twigs, about the superficies of the lungs. They are called *bronchia*. These are framed of a whole circle, being round. These are placed between the branches of *vena arterialis* and *arteria venalis*, to coole the blood : The artery being in the fore-part, the vein in the hinder.

It hath veins from that branch of the external jugular, which passeth to the mouth. Arteries it hath from the great and deep branch of the soporal which passeth to the throat. Nerves it hath from the sixth conjugation, called *recurrentes*; because having marched downward, they turn up again to the muscles of the *larynx*. Two pair of glands are placed at the sides of the *layrinx*; the first pair is seated at the sides of the *uvula*; about the root of the tongue. They are covered with the common membrane of the mouth; they receive the superfluous humidity of the brain and turn it into spittle. They are called

*tonsillæ*.

*Bronchia.*

Its vessels.

Glands.

*tonsilla*, and by Chirurgions *amidale*.

The second pair in the lower part of the *larynx* rest upon the buckler-like cartilage. These in women, by reason of their moist temperature swelling, cause their necks to be round, whereas in men, chiefly of a dry complexion, they becomming lank discover the protuberance of the fore-part of the *larynx*, which is called *pomum Adami*.

Its  
mem-  
branes.

It hath two membranes; one external and thin from the *pleura* cleaving fast to the ties of the cartilages.

The other internal from that which covereth the roof of the mouth, of a thicker substance having straight fibres and bedewed with an unactuious humour to withstand sharp rheums, of an exquisite sence; so that if but a crum chance to fall into it, it will be like to strangle one.

## CAP. XI.

*Of the action of the Lungs.*

**T**He action of the lungs is called *respiratio*, or breathing: this is nothing else but the taking in and letting out of the air by the wind-pipe, that the heart the well-spring of the vital heat may be cooled.

Breathing is performed by two actions; to wit, inspiration and expiration. Inspiration is performed when the lungs are dilated, for then the air is drawn in; but expiration happeneth when the lungs are contracted, for then the air is compelled.

The blowing of a pair of bellows doth express these actions. Dilatation is caused by the elevation of the brest, but contraction by falling down of the brest. The brest is dilated by the eleven external intercostal muscles, all which perform the office of one muscle.

The  
parts of  
breath-  
ing.

muscles. These arise from the upper rib, and end by an oblique passage in the lower rib. The brest is contracted by the eleven internal intercostal muscles; contrary to the former in their beginning, insertion, and office: they cross one another in form of Saint *Andrew's* Cross; so that the motion of the lungs doth proceed from the motion of the brest. The connexion of the lungs doth make this manifest; for above they are fastened to the neck and back by the wind-pipe; in the forepart to the *sternum*; behind to the *vertebra*, by the *mediastinum*; below to the midriff by some *fibres* which spring from the upper membrane of the *pleura*.

## CAP. XII.

## Of the Neck.

**T**His part is called *Collum*, not a *Colendo*, because it used to be adorned with chains; but

but because it riseth from the shoulders *instar collis*, like a hil. It comprehendeth the distance between the head and brest. It was framed for the winde-pipe and mouth of the stomach.

Its denomination

The parts of it are either containing or contained. The containing are the same which are found in the rest of the body, saving that the *membrana carnosæ* seemeth to be fleshy.

Its parts. Containing.

The parts contained are these:

1. The *larynx* which is the upper part of the winde-pipe. When the gullet bendeth downward in swallowing, this starteth upward to give way to swallowing.

Contained.

It is framed of five cartilages:

1. Is *cutiformis*, or buckler-like; for within it is hollow, but without embossed; that part which sticketh out is called *pomum Adami*, and is greater in men than in women. 2. Is *Annularis*, because it is like a Turkish ring, and compasseth the whole *larynx*; in the hinder part it is broad and thick.

The cartilages of the *larynx*

3. And

3. And 4: Is *Guttalis*, beccause it resembleth the neck of an ewar: this is doble. They have upper and lower processe; the upper are soft, flaggy, bending outwards, being joyned together they are like the neck of an ewar: They make up the *Glottis*.

*Glottis.*

*Epiglottis*

5. Is in the upper part, and within the *Scutiformis*. It is soft, and called *Epiglottis*, because it is placed above the *glottis* or chink, and covereth it. It is of the forme of a tongue. It is appointed to hinder the falling down of any thing which may prove offensive unto the wind pipe when we eat or drinke. It is pressed downe by the weight of the things which are taken by the mouth, and turneth them downe to the *gula*. Being suspended by a ligament, being pressed downe it riseth up immediatly. 2. Part contained is the mouth of the stomacke. It is called *Pharynx* from *φάρυγ*, because it conveyeth the meat and drink to the stomacke. It is fleshy. The attraction of it is performed

*Pharynx.*



formed by the straight; but the expulsion by the orbicular fibres. 3. Is the *uvula*: It is a red, fleshy, and fungious substance. It is covered with the red application of the skin of the roof of the mouth. 4. The fororal arteries. 5. The internal jugular. 6. The recurrent nerves between these: of all these parts the *larynx* is framed for the voice. The remote instruments of the voice are the breast and lungs. The neerer, either prepare as the wind-pipe, or help as the sinews and muscles, or keep it as the throat or mouth, or immediately form the voice, and that is done by the *glottis*; for the air being forcibly blown out of the lungs, it beating upon the chink shut reasonably, procureth the voice.

The living creatures which make no voice have no neck, as fishes. The *uvula* causeth the pleasant sound of the voice: besides it hath these uses: 1. It stayeth the air a little, that it pass not cold and impetuously to the lungs. 2. Like a

fanne

*Uvula.*

The fororal Artery.

The internal jugulars.

The recurrent nerves.

The instruments of the voice.

What living creatures have no voice.

fanne it putteth back dust, and such like bodyes. 3. It hindereth the going up of liqu'd things to the nose. If it be deficient, the voice becometh unpleasant; and the lungs are cooled and made apt to receive defluations, by the which they are ulcerate, and so *tubercles* procured.

THE



THE THIRD  
B O O K E;  
OF THE  
H E A D.

CHAP. I.

*Of the common parts containing.*



Now followeth the third great venter of the body, called *Caput*, the head; because the senses and nerves take their beginning from thence.

It is placed in the highest region most fit for the senses, but chiefly for the eyes; for they ought to

Its denomination

Its seat.

to be placed there as in a watch tower; and they having but soft finewes, which could not endure a long passage, it was requisite that the braine should be at hand.

Its figure

Of figure it is spericall; yet somewhat flattish and long.

Its parts.

The parts are of three sorts, for they are distinctive or expressive of the regions, or constitutive of the whole.

The parts distinctive are two, the hairy scalpe called *calva*, and that without haire called *facies*. The parts which expresse the regions, are four: 1. *Sinciput* or the fore-part reaching from the forehead to the coronall suture. 2. *Occiput*, the noddle, or the hinder part beginning at the suture *lamdoides*, and reaching to the first *vertebra* of the neck. 3. And 4. are called *tempora*, or the temples. The laterall parts between the eares and eyes.

The parts constitutive are either containing or contained. The containing are either common or proper.

proper. The common are *cuticula cutis*, and *membrana carnosæ*: the *cuticula* is thinner and softer; but the skin thicker then in any other part of the body, yet *porous* to give way to the nourishment of the hair. The *membrana carnosæ* in some it so cleaveth to the whole skin, that they can move all the skin at their pleasure: fat was not requisite, lest it should have hindered the discharging of the fuliginous vapours, and caused the heat to be too big.

## CAP. II.

### Of the Hair.

SEing the skin is garnished with hair, I will discourse briefly of it. A hair is a body, cold and dry, small, thred-like, hard and flexible budding from the skin. The hairs are not round, but four square, as the stalks of some plants. This may be discern-  
ed

Its deno-  
mination

Its figure

ned if a haire be put into the opticke instrument, called *Jack in a Box*.

The  
parts of  
it.

A haire hath three parts, one outward which will admit cleaving : The middlemost flexible ; and lowermost, which is called the root. It is white, and beset with a mucous substance, by the which it cleaveth to the skin.

The  
matter.

Haires are produced, not of the fuliginous excrements of the braine, but of blood drawne by the roots, and bestowed upon the trunks ; As the feathers in fowles are produced ; for if you plucke out any from very young ones, you shall manifestly see that blood doth both produce and feed the haire.

Their  
substance

The substance of the haire is compact, solid, and hard, apt to be cleft, according to the length, and laterally flexible.

Their  
colour.

The colour of them is answerable to the naturall constitution of the party. They are most commonly straight in those which are borne

born in cold countries, but curled in those who inhabit hot climates.

They are short and thin in infants, longer and harder in men, but longest in women.

The hairs have four uses; for they serve for defence, and beauty, and serve for the expulsion of fuliginous vapors, and show the temperature of the whole body and skin.

Their bigness.

### CAP. III.

#### *Of the proper containing parts.*

**T**He proper containing parts are four; to wit, the muscles, the *pericranium*, the *cranium*, and the *Meninges*: Look for the muscles in the treatise of the muscles, and for the *cranium* in the doctrine of bones.

The *pericranium* is a membrane thinnish and white, immediately seated under the *membrana carnosæ*.

The *pericranium*.

It

No *Periostium*.

Its connexion.

The meninges.

It covereth the whole skull, except where the temporal muscle lyeth upon the *cranium*. It being stretched over the temporal muscle doth firmly binde it. And seeing it is most tender, it causeth horrible pain and inflammation, when the temporal muscle is wounded. There is no *Periostium* besides it, yet it is double; and being of a competent thickness, it may be divided: as all membranes of the like nature.


It is tyed to the *dura mater* by some nervous fibres, which pass within the skull, to stay firmly the *dura mater*, and so the brain from inordinate moving. And although in infants new born these be strongly united; yet in process of time they part, and become joyned onely by some fibrous ties; from it to the brain by these inflammation may be communicated.

The Meninges follow, called by the *Arabians*, *matres*; as if all the membranes of the body were propagat



propagate from them : they are two in number, the *dura* and *pia mater*. The *dura mater* having in the upper superficies of it many veines, it representeth the leafe of a Figtree. It is a little distant from the skull, to give way to the motion of it. It hath two membranes; the upper towards the *cranium* is harder, rougher, and lesse sensible; because it was to touch the hard skull.

*Dura  
mater*

 The lower is smooth, slippery, and as it were, bedewed with water : It hath its beginning from the *basis* of the skull, unto the which it cleaveth firmly. It hath connexion with the skull and *dura mater*, by nervous fibres. It hath a threefold use. 1. It wrappeth in the braine, and the sinewes proceeding from it, and is a defence unto them 2. It divideth the brain from *cerebellum*. 3. It divideth the braine it selfe in two parts, the right and left. This division, by reason of the figure of it, being broader in the hinder part; and by

*Pia mater*

degrees growing narrower is called *falx*, or the *sicle*.

*Pia mater*

*Tenuis* or thin *meninx*, or *pia mater*; It immediatly covereth not only the outmost parts of the brain, but the inner cavities in like manner. It receiveth from the *crassa meninx* innumerable branches of vessels, and bestoweth them upon the braine.

It hath two uses; First, it keepeth the soft substance of the braine from running abroad. Secondly, it cloatheth the *cerebrum*, *cerebellum*, and the finewes. It is of an exquisite sense to observe such things might hurt the braine.

#### CAP. IV.

*Of the nature of the  
Braine.*

The colour of  
the brain

THE *Pia mater* being taken away, the braine offereth it selfe: Which in colour is white, that the animall spirits might be clear;

clear ; which otherwise in a dark place of another colour would become less clear, and troubled.

The substance is thick, viscous, soft, and white. It is not a glandule, for it is the seat of the animal spirits ; but glandules are appointed to receive excrementious humours & it is more curiously framed then any glandule : neither is it of a marrowy substance ; for marrow swimmeth in water, but this sinketh. Besides, the marrow nourisheth the bones ; but the brian nourisheth no part. The substance of it differeth from all other parts of the body ; as the stones do.

The substance of it doubtless, is a *parenchyma*, a substance oft used about the beginning of the nerves ; at that of the heart and liver are.

A man of all other living creatures hath the biggest brain ; for it weigheth four or five *lib.* in some, and is as big again as an Oxes brain : for by reason of the

Its substance.

Its bigness.

multitude of the animal function, plenty of spirits is required, which cannot be procured but by great store of blood, which cannot be contained within a narrow place.

The figure of the outer most circumference.

The outer circumference is full of windings, as the guts are; that the vessels being in these, as furrows, might safely be carried throughout the substance of the brain to nourish it.

## CAP. V.

### *Of the upper region of the Brain.*

**T**He brain hath three parts, *cerebrum*, that which properly is called the brain: the *cerebellum*, the little brain: and that part of the beginning of the *spinalis medulla*, which is within the skull.

Its difference from *cerebellum*.

The brain differeth from the *cerebellum*, first, in substance; for it

it is softer ; secondly, in colour, for it is whiter ; thirdly, in bigness, for it is three times as big ; fourthly, in cavities, because it hath many.

The brain hath three regions ; the upper, which is varicous ; the lowermost which is called *basis* ; and the middlemost. The upper part is divided into two parts, by the sickle-like process ; to wit, the right and left. In it there is a twofold substance ; for the upper part of it is softer, and of an ash-colour.

If you take away the three inches broad of this substance, then the *corpus callosum* will appear ; which is nothing else but the whitest and most solid substance of the brain.

*Corpus  
callosum.*

About the bottom of this division of the brain, there appeareth a white substance, if you bring the sides gently together with your finger ; which is called *septum lucidum*. It is loose and wrinkled ; but if it be spread abroad, it

*Septum  
lucidum.*

Fornix.

appeareth clear. It cleaveth above to the *corpus callosum*, but below to the *fornix*. Some will have it to be a reduplication of the *pia mater*; others a portion of the brain. Under the *corpus callosum* the *fornix*, or vault is seated of the like substance. In the upper part it is arched; but in the lower part *convex*. In figure it is triangular. It holdeth up the weight of this upper region from bearing down the subjacent part.

## CAP. VI.

*Of the middle region of the brain.*

Their  
number.  
The an-  
terior.

**U**NDER the *testudo*, first, the ventricles are seated, called *sinus*. They are accounted four in number, whereof two are anterior; to wit, the right and left; they are severed by *septum lucidum*. In the inner part they are covered with a membrane of an exquisite feeling

feeling, having its beginning from the *infundibulum* ascending. Between these *sinus* and the *fornix* there are two textures of vessels, one on each side, framed of the complication of small veins, tyed together by a thin membrane. They are called *plexus chorioformes*: Because they are like to the membrane wherewith the childe in the wombe is wrapped, called *Chorion*.

*Plexus  
choroides.*

The third ventricle is nothing else, but the meeting of the former two, towards the hinder part. In it there are two passages: the first in the fore-part, which marcheth straight-waies down to the *infundibulum*. The second passeth under the *testes* and *nates* to the fourth ventricle. About this there is a chinke called *vulva*.

The posterior.

The *infundibulum*, or funnell, is a certaine cavity under the third ventricle framed of the *pia mater*, which becomming narrower representeth a funnel. It endeth in the *glandula pituitaria*, which re-

*Infundi-  
bulum.*

*Glandula  
pituitaria.*

ceiveth the fleagme falling from the ventricles of the braine. It is placed in the foure-square hollownesse of the wedge-like bone.

About this glandule, about the sides of the aforesaid cavity there is a membranous twisting framed of innumerable twigs of arteries; which spring from the largest branch of the soporall artery, which passeth by a proper hole in the bones of the temples into the capacity of the *cranium*: It is called *rete mirabile*, representing a net spread abroad.

Here, of the pleasant breathing of the blood, naturall sleepe is caused; but if the arteries be too full, a deepe sleepe is caused. if you blow up the soporall artery in the neck, they will be blown up also. Then the *infundibulum*, *glandula pituitaria* and *rete mirabile* are seated in the lowest region, or basis of the braine.

The fourth ventricle is placed betweene the lower part of the *cerebellum* and the beginning of the

*Rete mirabile.*

4. Ventricle.



the *spinalis medulla* ; and because it being round endeth in a narrow point, it is called *calamus scriptorius*.

*Calamus  
scriptorius*

The chink is caused of the division of the root of the *spinalis medulla*.

About the hindermost hole of the third ventricle, which passeth to the fourth ventricle, certain round bodies appear, small portions of the brain, having their denomination from those things which they resemble. The first is *glandula pinealis*, or *penis* ; because it representeth the Pine-Nut, or a Prick. It is seated in the beginning of that pipe by the which the third and fourth ventricle are united. Neer to this on both the sides of the third ventricle four round bodies appear. The two upper are lesser, and are called *testes* : the two greater bearings out are called *nates*. The chink between the *nates* is called *anus*. The use of these ventricles is to carry safely the venal blood ; for it

*Penis*

*Testes*  
*Nates*  
*Anus*  
The use  
of the  
ventri-  
cles.

was not safe for the veins to be carried through the soft substance of the brain ; lest the veins being compressed by the weight of it, the passage of the blood should have been hindered.

Nature hath placed the ventricles aloft ; because the blood being heavy is apt to pass down of it self. From the third ventricle innumerable veins pass by the windings of the brain, to the inner substance of it. In these ventricles onely the venal blood is contained, carried thither by the internal jugulars, which end at the beginning of the lateral ventricles.

## CAP. VII.

### *Of the Cerebellum.*

**T**He second part of the brain is called *Cerebellum*, or the little brain. It is seated in the hinder part of the head or skull,

unto

unto the which it cleaveth by the two membranes wherewith it is wrapped. It differeth from the braine in sundry points. First, in substance; for it is harder. Secondly, in bignesse; for it is scarce so big as the third part of the brains. Thirdly, in figure; for it is more flat than round. Fourthly, in cavities; for within it is not hollow. Fifthly, in colour, for it tendeth to a yellowish gray colour.

How it  
differeth  
from the  
brain.

It is framed of foure parts, whereof two are laterall, the right and the left: these are spericall: two are in the middle; at wit, the foremost and hindermost. These are round.

Its frame

*Processus  
vermiformes.*

They are framed of sundry orbicular portions; and because they are like unto the wormes which are in hollow timber, they are called *processus vermiformes*, worm-like *processus*.

The one is in the fore-part of the fourth ventricle; the other in the hinder part.

Their

Their use

Their use is to hinder the beginning of the cavity of the *spinalis medulla*, by the *cerebellum*.

## CAP. VIII.

*Of the spinalis medulla.*

Its name.

**N**OW followeth the third part of the braine, called *spinalis*, or *dorsalis medulla*.

Its substance.

The substance of it is not double, as it is in the braine, but uniforme, white, and compact; as it groweth in length it becommeth more and more hard.

Its parts.

It hath two parts; *viz.* that which is contained within the braine, and that which is kept within the *vertebrae* of the back-bone. That which is within the skull is about foure inches in length. That which is without, and beginneth at the great hole, reacheth to the *Coccyx*, growing smaller, and smaller, untill at last it end in many small twists, which resemble

resemble a horse taile.

It hath three membranes. The first is that which immediatly toucheth it. This springeth from the *dura mater*, and passeth between both the parts of it. The vessels which afford nourishment and life, passe alongst this membrane. The second covereth this, and springeth from the *dura mater*. There is no distance between, as is seen in the braine, but one toucheth another. The third proceeding from the ligament which joyneth together the *vertebra*, covereth both these.

Its membranes.

It is divided all along, as it were by a long section untill you come to the *vertebra* of the loines: you may separate these parts by boiling, for then they will fall asunder. This division is the cause that sometimes one side only is paralytick. The *spinalis medulla* in figure is round.

Its division.

It springeth both from the *cerebrum* and *cerebellum*. Two tootes it hath from the fore-part of the braine,

Its figure.

Its beginning.

braine, about the middle of the ventricles: these are in the forepart, and bigger, and are called *nates*. It hath two in like manner which are lesser, and are called *testes*. They spring from the lower part of the *cerebellum*. These marching towards the backe-part, meet together, and make the *spinalis medulla*.

The hinder trunks are clipped with a proceffe; which by *Rawlins* is called *pons cerebelli*.

The  
common  
errour  
concern-  
ing the  
ventri-  
cles of  
the brain

The cavity beteen the *cerebellum*, and the *spinalis medulla* is accompted the fourth ventricle, as the vacuity between the *nates* and *testes* the third, bnt erroneously; for they are not within the substance of any part of the braine; but are of a necessity caused by reason of the parts aforenamed: So that in truth there are but two ventricles, or rather one parted by the *septum lucidum*; yet for doctrines sake foure ventricles are set down.

C A P.

## CAP. IX.

*Of the actions of the Brain.*

**T**He action of the brain is this :  
 After that the spirits and blood are discharged into the *Sinus* of the *dura mater*, by the veins and arteries, to temper the heat of them, the brain is ordained (seeing it is colder then the heart) that the animal functions, which are feeling and moving, may be the more readily executed.

Wherefore the animal spirits seem not to differ from the vital spirits in substance, but in qualities ; to wit, the temperament and attenuation ; for they must be more temperate, because heat doth both taint the reason (as we may see in drunkenness and raving) and hindereth or perverteth the motion.

The spirits ought also to be more subtil ; because they are to pass, like a thunder, through the bodies  
 of

Whether  
 the ani-  
 mal spi-  
 rits differ  
 in sub-  
 stance  
 from the  
 vitall.  
 Why they  
 ought to  
 be tem-  
 perate  
 And sub-  
 till.

The  
place of  
the rea-  
sonable  
Soul.

of the nerves. So, as the vital spirits are carried to the parts of the body by the arteries, so the animal are carried by the nerves.

The animal spirits for this cause also ought to be subtil, because the reasonable soul is resident in the brain, which doth contemplate things immaterial, as Angels and it self.

### CAP. X.

*Of the sinews proceeding from the brain, and first of the first pair.*

Eight  
pair of  
sinews  
proceed  
from the  
brain.

SO much then of the substance of the brain; It follows then that we shew the sinews which proceed from it; of them there are eight pair comprehended in these verses:

*Optica prima; oculos movet altera;  
tertia gustat:*

*Quarta, & quinta audit; vaga sexta;  
at septima lingue est;*

*Octava olfactum regit, aëre naribus  
hausto.*

The



The first paire, the *optici* or *visorii nervi* make; these bestow upon the eyes the faculty of seeing. They spring from the beginning of the trunks of the *spinalis medulla* in the nowle. They march on from thence drawing neerer one to another, untill they meet at the cell of *Os sphenoides*; where they are united, not by simple touching, or interfection, but by confusion of their inner soft substance. These of all the rest are biggest and thickest, but softest. In their beginnings they are softest, but become harder, that they may passe the more securely so long a way.

The first pair.

These are hollow untill they be united, then the hollownesse cannot be discerned. This hollownesse may be shewed in a large beast newly killed, and in a cleare light. After their union they are separate, and each of them, passing through the first hole of *os cuneiforme*, obliquely are inserted into the center of the eye.

The hollownesse of the optick nerves.

Their insertion

These

Their Mem-  
branes,  
and mar-  
rowy  
substance

The use  
of these  
nerves.

These nerves have two membranes, and the inner soft marrowy substance. The membranes spring from meninges. The inner substance from the body of the braine.

These nerves cannot be divided into many twists, as other nerves are, but frame the tunicles of the eye; for the *cornea* doth proceed from the thick membrane, the *uvea* from the thin membrane, and the *retina* from the marrowy substance.

## CAP XI.

### *Of the second and third Pair.*

The  
second  
pair.  
Its be-  
ginning.  
Why both  
the eyes  
are dire-  
cted to  
the same  
object.

THE second paire is termed *motorium oculorum*, because it moveth some muscles of the eyes. It hath its beginning about the innermost part of the beginning of the *spinal's medulla*.

These sinewes are so united where they spring out, that they make

make a common corner, which is the cause that both the eyes turn to the same parts.

It is smaller and harder then the former, and cometh out of the skull by the second hole of *os cuneiforme*, which is long; and so entereth into the orbick of the eye.

Its substance.

It hath sundry sprigs: the first mounting above the optick, it is bestowed upon the attollent muscle, and the eye-lid. The second easie to be seen, is bestowed upon the adducent muscles, by sundry small twigs. The third by many *fibres* is inserted into the depriment muscle. The fourth is inserted into the lesser oblique muscle, about the outer corner. So that this pair onely moveth four muscles.

Its sprigs

The third pair proceedeth from the lower part of the root of the *spinalis medulla*, in the beginning, being very small; from thence it marcheth directly forward under the *basis* of the brain, accompanying

The third pair  
Its beginning,  
marching, and  
insertion

Its  
branches

panying the second pair, with the which it passeth through the second hole of the wedge-like bone, and entereth into the orbit of the eye. Then it is divided into four branches: the first bestoweth a branch upon the greater oblique muscle, which hath the *trochlea*: Then passing through the hole of *os fontis* above the orbit, it is bestowed upon the muscle of the eye-brow and the skin. The second marcheth downwards, and passing through the hole of the upper jaw-bone, which is under the orbit, is bestowed upon the muscles, opening the upper lip and nostrils, as also the gums of the incisory teeth of the lower gum. The third passing by the hole of the second bone of the upper jaw, which is under the caruncle of the great corner, is bestowed upon the inner membrane of the nose. This being very sensible causeth sneezing if any sharp thing toucheth it. The fourth cometh out of the fourth hole of *os sphenoides*,

The  
cause of  
sneezing

*noides*, which is the chink neer to the outward corner of the eye, and goeth to the inward part of the temporal muscle. This bestoweth the faculty of moving to the forenamed muscle.

## CAP. XII.

*Of the fourth and fifth pair.*

**T**He fourth pair springing neer the place of the former, passeth through the sixth hole of the wedge-likebone; and passing downward, it is divided into three branches; the first being twisted, it is united into two twigs of *nervus auditorius*, and is bestowed upon the muscles of the cheeks and lower jaw. The second is inserted into the gums of the grinders of the upper jaw. The third entereth into the hollownes of the lower jaw, and bestoweth a twig to the roots of all the teeth. It endeth in the skin of the

The fourth pair.

Its branches.

Its ending.

the lower lip, and the membrane of the tongue neer the root. Ordinary Anatomists make but one pair of these two last, and set it down their third; but these two are united neither in their beginning nor insertion.

The fifth  
pair.  
Its be-  
ginning.

The fifth pair proceedeth from that place where a portion of *cerebellum* is united to the brain, lengthened by two nerves; whereof the one is softer, the other harder. These pass out of the membrane together; and by the hole of *os petrosum* enter into the wreathed hollownes of the ear.

Its twigs.  
Why they  
that are  
born deaf  
prove  
dumb.

The harder sendeth twigs to the throat, nostrils, and a twig to the tongue. By reason of this twig they that are born deaf prove also dumb.

The softer nerve when it is come to the first cavity of the ear, it covereth it like a membrane; and truly may be called *nervus auditorius*, seeing it doth afford the spirits to the hearing.

## CAP. XIII.

Of three other paires.

THE sixth paire is called *vagum*, because it bestoweth branches upon sundry parts; and amongst the rest, to all parts of the belly which require feeling; for these being soft parts did not require hard sinewes from the *spinalis medulla*.

The sixth pair.  
Its insertion.

This ariseth from the hinder and lower part of that place, from whence the former sprung, by many small twigs. These make up two distinct nerves which are covered with one membrane borrowed from the *dura mater*. So joyned, they passe through the second and third hole of the nowle, by the which the lesser branch of the soporall artery, and the greater of the jugular enter into the skull.

Its beginning.

The lesser of these branches is seated more forward, and when it is come

Its branches.

come out of the skull it is spent upon the muscles of the throat & tongue, and the parts contained within the mouth. The greater is seated more backwards. This before it enter into the brest; above the throat, it is divided into two branches; to wit, the Exterior which is lesser, and the Interior, which is greater.

Their  
current  
nerves.

From the Exterior those nerves doe spring, which are called *recurrentes* or *reversivi*, because they descend and ascend againe; and *vocales*, because they being cut, hinder the voice.

Of these the right is winded about the axillar artery, as about a pulley. The left is wound about the *aorta* descending; afterwards mounting up, they are inserted into the beginning of the muscles of the larynx, which are in the lower part. This Exterior is bestowed upon the parts of the middle cavity. The Interior branch is bestowed upon the parts of the abdomen. The right sprig serving  
for



for these in the right side, and the left serving those in the left.

The seventh pair, which affordeth moving and feeling to the tongue, is hardest of all.

It hath its beginning where the *cerebellum* endeth, and *spinalis medulla* beginneth.

In its beginning it hath divers sprigs, which afterward are united & pass through the fourth and fifth holes of the nowle; which are placed between the great hole, by the which the *spinalis medulla* passeth; and that out of which the sixth pair issueth. As soon as it is come out, it is united to the sixth pair by a membrane. When it is come to the root of the tongue, it bestoweth most branches upon the muscles of the tongue, but fewest upon those of the *larynx*.

The eighth pair may be called *Olfactorium*, because it serveth for smelling. They arise at the hinder sides of the brain, which are above the holes of hearing. They are sharp in their beginning, and

The seventh pair.

Its beginning.

Its frame.

The eighth pair.

L                      sepa-

separate : They end in the *processus mamillares*, or *papillares*. In number they are two, white, soft, broad, long. In man they are but small ; but in beasts of exquisite smelling (as Hounds) large.

## CAP. XIV.

*Of the nerves of the spinalis medulla ; and first of the nerves of the Neck.*

What it is.

**O**ut of the *spinalis medulla*, which is nothing else but the production of the *cerebrum* and *cerebellum*, by the *vertebrae* of the back do spring all the sinews which move all the other parts of the body.

Its membranes.

The Nerves which spring from it.

The *spinalis medulla* hath three membranes, two as the brain, one harder, the other softer, and the third membranous and strong, which *Galen* took to be the ligament of the *vertebrae*. From it do spring thirty pairs of sinews ; seven of the neck,

neck, twelve of the brest, five of the loines, and seven from the holes of *os sacrum*.

The first pair in the fore-part commeth out between the nowle-bone and the first *vertebra* of the neck, and is bestowed upon the muscles which bend the neck, which lie under the *œsophagus*. In the hinder part it commeth out of the hole, which is common to the nowle-bone, and the first *vertebra* of the neck.

The first pair.

It hath two twigs: The smaller is bestowed upon those which stretch out the neck. The bigger is inserted into the beginning of the muscle which lifteth up the shoulder-blade.

Its twigs

The second pair in the fore-part, where it is smallest, it commeth out between the second and third *vertebra*, and is bestowed upon the skin of the face. In the hinder part it commeth out at the sides of the process of the second *vertebra*, but presently it is parted into two twigs. The thicker is

The second pair.

The  
third  
pair.

bestowed upon the whole skin of the head, even to the crowne. The smaller is bestowed upon greater, straight, and the lower oblique muscles which stretch out the head.

The third paire commeth out of the laterall hole, which is betwene the second and third *vertebra*, and immediately is divided into two branches; whereof that which in the fore-part, hath foure twigs: the first commeth to the long muscle; The second is bestowed upon the muscles which ly under the *œsophagus*; The third goeth to the skin of the back-part of the head. The fourth is bestowed upon the transvers muscles of the neck, and the muscle which lifteth up the shoulder blade; The hindermost branch is bestowed upon the second paire which heaveeth up the brest.

The  
fourth  
pair.

The fourth paire commeth out of the hole common to the third and fourth *vertebra*, and hath two branches: The foremost hath three

three twigs. The first is bestowed upon those which bend the necke. The second is bestowed upon the transvers muscle of the necke, and the *cucullaris* of the shoulder blade. The third goeth to the sinewy part of the midriffe. The hindermost branch goeth to the backe-bone under the muscles of that part, upon which it bestoweth twigs.

The fifth paire marcheth out between the fourth *vertebra*; and hath two branches. The foremost hath foure sprigs; the first goeth to those that bend the necke: the second goeth to make *nervus phrenicus*: the third to the *Deltoides*: the fourth goeth to the *deltoides*, and to the *Coracohyoideus*. The hindermost branch goeth to the *spina*, and is bestowed upon the muscles there.

The fifth pair.

The sixth paire commeth out under the fifth *vertebra*, and hath, as the rest, two branches: The foremost sendeth first one sprig to make *nervus phrenicus*: then it goeth to the arme: The second

The sixth pair.

The  
seventh  
pair.

branch goeth to the muscles behind which stretch out the neck and head.

The seventh paire commeth out of the hole common to the sixth and seventh *vertebra*. The foremost and largest branch is carried to the arme. The hindermost and smallest is bestowed upon the muscles of the necke, and quadrat muscle which pulleth downe the cheek.

## C A P. XV.

*Of the nerves of the vertebra  
of the Brest.*

The first  
pair.

**F**ROM the marrow of the *vertebra* of the brest, twelve paires doe spring. In all of them, the foremost branch is biggest; but the hindermost, which is bestowed upon the muscles seated in the back, smallest.

The first, springeth out of the hole which is common to the seventh

seventh *vertebra* of the neck, and the first of the brest. The foremost branch marcheth upwards towards the *sternum*, and bestoweth a twig of *musculus subclavius*, and those which arise from the *sternum*; and that which from the hollowness of the shoulder-blade. The hindermost branch, lurking under the muscles which cleave to the *vertebrae*, is bestowed upon the muscles of the neck, head and shoulder-blade.

The second issuing out of the place between the first and second *vertebra* of the brest, passeth to the arms, and produceth the first intercostal nerve, from whence twigs pass to the muscles seated upon the brest; both the foremost and hindermost branch have the same distribution.

The second pair.

The rest of the ten paires come out of the lateral holes of the *vertebrae*, and immediatly are divided in two branches; whereof the foremost being larger, make up the intercostal nerves; and being

The rest of the pairs.

joyned with the intercostal veines and arteries, and received into the groop of the lower part of each rib. The hindermost march towards the back-bone, amongst the muscles which cleave to the *vertebra*, and serve for the stretching out of the brest.

## CAP. XVI.

*Of the sinews of the marrow of the vertebra of the loyns.*

The first pair.

**A**lthough there be but four lateral holes in the *vertebra* of the loynes; yet there are five pairs of sinews. The greater foremost go to the muscles of the belly. The hindermost goe to those which rest upon the *vertebra*. The foremost are tied together, the first with the second, the second with the third, the third with the fourth, and the fourth with the fifth.

The first commeth out of the lateral



laterall hole between the last *vertebra* of the brest, and the first of the loynes: the formost branch is bestowed upon the fleshy part of the midriff, and the muscle *Psoa*. It sendeth also a twig by the *arteria preparans* to the stone. The hindermost is bestowed upon the *musculus longissimus* and *sacrolumbus*.

The second commeth out between the first and second *vertebra* of the loynes. The formost branch is bestowed upon the *musculus fascialis*, and the skin of the thigh. The hindermost is bestowed upon the *musculi glutai*, and the membranous muscle which stretcheth out the leg.

2.

The third marcheth out between the second and third *vertebra*. The formost sendeth one twig to the knee and skin thereof, and another which doth accompany the *saphena*. The hindermost turneth back, and is bestowed upon the muscles which rest upon the loynes.

3.

The fourth being the largest of

4.

the muscles of the loynes marching under the *os pubis*, doth accompany the veine and artery, which passe to the leg.

The fifth commeth out between the fourth and fifth *vertebra*, and is bestowed upon the *obturatores musculi*, and the muscles of the pricke. The hindermost is bestowed upon the muscles and skin which are above the *vertebra*.

### CAP. XVII.

*Of the nerves which come from the marrow of os sacrum.*

The first pair.

**F**ROM the marrow of the *os sacrum* six paires of sinewes spring.

The first issueth out between the last *vertebra* of the loines, and the first of *os sacrum*. The foremost branch of it is bestowed upon the muscles of the belly, and the second which bendeth the thigh. The hindermost is bestowed upon

upon the skin of the buttocks, and the greatest *glutæus*.

The other five pairs on each side have two pairs, whereof the first three go to the legs. The second under these are bestowed upon the muscles of the bladder and fundament, to the neck of the matrix in women, and to the prick in men. The last are spent upon the muscles of *os ilium*, and *sacrum* towards the back part, which are *longissimus*, *sacrolumbus*, *sacer*, and the *glutæi*.

Of the other five pairs.

# CAP. XVIII.

*Sheweth how the brain is to be dissected.*

**T**He brain is to be divided in three parts; to wit the uppermost, the middlemost, and lowermost part.

In the uppermost, these parts are to be seen; the windings, *falx*, and *corpus callosum*.

In

In the middlemost under the *fornix*, behold the ventricles, the *plexus choroides*, and *cerebellum*.

In the lowermost you shall finde the *infundibulum*, the glandules under it, *processus mammillares*, eight pair of sinews and the roots of the *spinalis medulla*.

## CAP. XIX.

*Of the outward parts of the eye.*

**W**EE have spoken of that part which is decked with hair: Now we are speak of that part which is not altogether garnished with hair. In Latin it is called *facies*, in English, Face, because it causeth every one to be discerned who he is.

The parts of it are either common or proper: The common are, *cuticula*, *cutis*, *adeps*: it hath no *membrana carnosae*, for it endeth in the chin, and the fat is onely in the places between the muscles. The parts

Of the face.

The parts of it.  
The common

parts proper are either containing or contained. The parts containing are the muscles and bones, which are set down in their proper places. The parts contained are the instruments of the four Senses, to wit, the eye, the ear, the nose, and mouth. First then of the eye, partly because without sight the life is tedious; partly because the object of it is most subtil. They are in number two; First to look aside. Secondly, to see by one if the other be lost. Thirdly, to see more distinctly and clearly.

In figure they are round: first, because this figure is most capable of the multitude and bigness of the objects, and fittest for quick motion. They are seated high, the better to essay, & to govern motion which is foreward.

The parts of eye are either external or internal. The external are in number four. First, the eye-brow, the seat of disdain and pride. It is framed of the skin, muscles, fat, and hair. The skin is thick

The proper.

Why the eye is first to be handled. Why two

Their figure.

Their situation

Its parts. The external. The eye-brow.

The motion of the eye-lids.

The hairs of the eye-lids.

The frame of the eye-lid.

The corners.

The glandule

thick and hard to hinder the immoderate growing of hair. It is oblique the better to turn away those things which might fall into the eye. Secondly, the eye-lid ; in man the uppermost is biggest, and moveth ; but in birds the lowermost is biggest, and moveth.

The hairs called *cilia* in the upper lid turn upwards, but in the lower downwards, that they should not offend the eye and sight. They repel small bodies from entering into the eye.

It is framed of the skin; the muscularous flesh, and a grissly welt, which keepeth the *cilia* from growing. Thirdly, the corners, the greater is toward the nose, the lesser towards the temples. Fourthly, *caruncula lacrymalis*, the glandule in the greater corner, seated before the hole which passeth into the nose. In it are the holes by the which the tears issue. In it is seated the *fistula* of the eye.

## CAP. XX.

*Of the tunicles of the eye.*

**T**He inner parts are in number five the first is the fat, which first defendeth the eye from cold: secondly, keepeth it from the hardnesse of the bone: Thirdly, moisteneth the eye: Fourthly, filleth the distance between them. Secondly, the fixe muscles, which are set downe in their proper place. Thirdly, the tunicles, whereof the first is called *conjunctiva* and *adnata*; because it cleaveth firmly to the eye, and keepeth it within the *orbita*, that it start not out in violent motions. It covereth the halfe of the eye orbicularly, but it springeth from the *pericranium*. The second is *cornea*, because it is like to a Lanterne horne in firmnesse and brightnesse; it may be severed into many skins. In the fore-part it is thinner and brighter; but in the hinder-part thicker and

The use  
of the fat.

The  
muscles.  
The tu-  
nicles.

and darker. It is thin, that the *visibiles Species* may the more readily be carried to the cristallin humour. It is smooth also: for if it were wrinckled it would have hindered the sight. It springeth from the *dura mater*. The third is *uvea*, because it is like to the husk of the black grape, for in colour it is not unlike, and smooth without, and rough within. It is of sundry colours, the better to apprehend colours. The inner side is blacke, that a weake light might the better be seen by the cristallin; for light in a darke place shineth the more brightly. It springeth from the *pia mater*. In the middle it is perforate, which maketh the *pupilla*: this is nothing else but the hole of *uvea*. The circle about the *pupilla* may be separated from the *uvea* in an Oxes eye boiled. Fourthly, *Cristallina*; it is a membrane thin and cleer, compassing the cristalline humour thinner before than behinde. Fifthly, *vitrea*; it is very thin, white, and smooth: If it be.

3.

The Pupilla.

4.

The cristallin.

5.



be cut, the *vitreus* humour issueth out.

CAP. XXI.

*Of the humours of the Eye*

**T**He humours make up the fourth internal part. They are in number three; *aqueus, cristallinus, vitreus*. The first is the waterish humour, so called, because it runneth as water; it hath no tunicle, it not onely filleth the cavity between the *cornea* and the cristallin humour; but compasseth also the vitreous humour; for if you cut the eye behind, it will as well run out there as before. The waterish humour is kept together by some small thred-like substances. They are under the circle of the *uvea*, and by reason of them the cataract groweth. This texture of filaments is by some called *tunica ciliaris*, so called, because they are black and like to the

I.

Where  
the cata-  
ract  
groweth.

2.

the eye-brows, but improperly. The second is the Crystallin humor, so called, because it resembles a Crystal or Ice ; it is of a compact waterish substance. It is plain before, that there might be a competent space for the receiving of the visible resemblances ; for the which use a round figure was not fit ; yet it is plain behind, where it sticketh in the humour vitreous. It causeth every thing to seem bigger. It is placed not in the middle of the eye, but neer to the *pupilla*.

3.

The third humour is the *vitreous* or glass-like humour ; for it is like to moulten glass. It is placed behind, that if any thing should escape the Crystallin humour, it might be stayed there, and not return to the *uvea*. It receiveth the Crystallin humour as a soft pillow, wherefore it is softer then it. It is more copious then the other two ; it is stayed by some filaments ; these being by incision separated, the glass-like humour runneth as water. The fifth internal

ternall part the vessels make. The externall veines proceed from the externall jugulars ; the internall from the *plexus coroides*. The externall arteries spring from the externall soporals ; but the internall from the *rete mirabile*. There be two nerves appointed for each eye, one for motion called *motorius* ; the other for sight called *visorius* , this is softer.

The fifth  
internal  
part.

## CAP. XXII.

### *Of the Auricula.*

**N**OW followeth the instrument of hearing, the eare. The eares are two, that the one failing, yet we might heare with the other. They are placed in the head, because sounds ascend, and because we have alwaies need of this sense.

The parts of the eare are either outward or inward. The outward is called *auricula* ; of it some parts are

The  
parts of  
it.

are common, some proper. The common are, *cuticula*, *cutis*, *membrana nervea*, *caro*, and fat in the lobe. The skin is thin ; under it there is small store of flesh, which is tyed to the cartilage by a membrane. The lobe, by reason of the flesh and fat, seemeth fleshy, and fatty. The proper parts of the *auricula* are the muscles, veines, arteries, sinewes, and the cartilage. As concerning the muscles, they are set downe in their proper treatise. The veines come from the externall jugulars ; the arteries from the soporals ; the nerves from the second paire of the neck. The cartilage was fittest for this place. If a bone had been here, it had been troublesome, and easily broken: if flesh, it had been subject to contusion, and could not have repelled the sound. It is tyed to *os petrosum* by a strong ligament, which riseth from the *pericranium* to stay it up.

Its uses.

The uses of the outward eare are these : first, it serveth for beauty. Secondly,

Secondly, to help the receiving of the sounds the more readily: for first, it gathereth them, being dispersed in the aire. Secondly, it doth moderate them, that they come gently to the *tympanum*. The haire here hindereth the creeping in of insects.

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GAP. XXIII.

*Of the inward parts of the eare.*

THE inward eare is framed of foure cavities, and their furniture. The first is, *meatus auditorius*, which is alwaies open; it hath windings, lest the air should suddenly rush in upon the *tympanum*. It is oblique; to abate the vehemency of a sound. It marcheth upwards, that if any thing should goe into it, it might the more readily fall out. It endeth at the *tympanum*, and containeth the eare-wax, by the which the braine is purged, and insects hindered from creeping

The  
drum.

creeping in, entangling them as birdlime. It endeth at the *tympanum*.

This membrane is very dry, that it might give the better sound. It is thin and clear, that the sounds may be the more readily sent to the internall aire. It is strong that it should the better endure externall harmes. It hath a cord for strength and stretching of it, even as the Military Drum hath. The second cavity by *Vesalius* is called *pelvis*, the tunel, by *Fallopins conchia*, the perwinkle, from its figure.

*Pelvis*.

The use  
of the  
things.  
contain'd  
in it.

The furniture of this cavity serves for three purposes, for motion, for transmission of sounds, and for the expurgation of the excrements; for motion, the three little bones, the ligament and muscles doe serve. ; The little bones are in number three; the first is *malleolus*, the little hammer. It hath a thick and long head, cleaving to a narrow and small necke. It hath a smooth cavity to be articulate with the anvil. It hath two processes

The  
three  
little  
bones.  
I.

cesses springing from the neck ; unto the upper, which is lesser and crooked, the corde of the Drum cleaveth. The membrane resteth upon the lower. The second is *Incus*, the anvil, having a head and two feet. The head is somewhat thick. In the top of it there is a smooth cavity which receiveth the knob of the hammer. The smallest and longest foot is tyed to the top of the stirrop; but the thickest, broadest, and shortest resteth upon the *os squamosum* of the temples. The third is *stapes*, or the stirrop. In figure triangular, in the middle hollow, to give way to the passing of the air to the *labyrinthus*. In the upper part of it, is a very small and round knop, upon the which the longest foot of the anvil resteth ; the *basis* is set to the oval hollownes, and the membrane shuteth it.

These bones, have no *periostium*, for then they would be unfit to return any sound. Secondly, they have neither cartilage nor marrow,

2.

3.

The qualities of these bones.

row, for they must be hard. Thirdly, in infants they are as perfect and as big as in men. Fourthly, they are placed up by a ligament, that being shaken by the internal air, moved by the external, the sharper sound may be caused.

Its uses.

These bones have these uses; First, they strengthen the *tympanum*; therefore the hammer with one of the feet of the anvil lean upon the Drum. Secondly, by shaking of the *tympanum*, they moved bring the better the sound to the auditory nerve. Thirdly, they further the receiving the diversity of sounds, as the teeth the distinction of words. Last of all, for motion the muscles are appointed: one is without the drum, above in *meatus auditorius*, whose tendon is inserted into the *tympanum*, against which the *malleolus* is inserted to draw it outwards together with the hammer. The other is within the Drum in *os petrosum*, inserted by a double tendon in the hammer to draw it back.

The



The third cavity is called *labirynthus*, because it hath sundry windings. There are fixe semicircles in this cavity. The end of these windings is to mitigate the sound which was redoubled within the *concha*, as an eccho.

The third cavity.

The fourth cavity is called *cochlea*, or a wilke, so called, from the figure; for it hath three, sometimes foure wreathings: within there is a chinke, by the which the sound passeth to the braine, and the bilious excrement falleth into the aire.

The fourth cavity.

The hearing is thus caused, The aire passeth through the first cavity, and gently beateth upon the drum, which being shaken, tosseth the three bones joyned to it. Then the kind of sound is impressed into the inward aire, which having the quality of the sound, and being circulate through the windings of the labirynth to make it purer, is conveyed by the *cochlea*, and delivered to the auditory nerve that the animall spirit may

How the hearing is caused.

present it to the common sense, the judge of all species.

## CAP. XXIV.

*Of the Nose.*

THE instrument of the third sense, smelling, ensueth, to wit- the nose. The parts of the nose are either externall or internall. The externall parts are these, the skin, the muscles, the veines, arteries, nerves, bones, and cartilages. First, the skin cleaveth so fast to the muscles and cartilages, that it cannot be severed without renting. Secondly, as for the muscles, they are set downe in the description of muscles. Thirdly, the veines come from the externall jugulars, as the arteries from the soporall. Fourthly, the sinewes come from the third paire, on each side one. Fifthly, the bones of the nose are set downe in the doctrine of bones. Sixthly, the cartilages are

The  
external  
parts.

1.

2.

3.

4.

5.

6.

are in number five; the two upper make up the half of the *Alæ*, the two under make up the other half; the fifth division the nostrils: the cartilages are onely moved by the muscles.

The inner part of the nose, are these: First, the membrane which covereth the inside of the nose, which proceedeth from the *dura mater*, and passeth through the holes of the *ethmoides* bone. Secondly, the muscularous membrane, which draweth together the nostrils. Thirdly, the hairs which disperse the air, and hinder the creeping in of insects. Fourthly, the red fleshy spongiuous substance, with which the holes of the *ethmoides* are filled up; from this the *polypus* springeth. The length of a comely nose is the third part of the length of the face. The upper part of the nose which is bony, is called *dorsum nasi*, the ridge *spina*. The lateral parts where the cartilages are, *alæ*, *pinnae*; the tip of the nose *globulus*, *orbiculus*, *pynula*. The fleshy

The inner parts.

The denomination of some parts.

its uses.

part next to the upper lip, *columna*.

The uses of the nose are these; First, by it the air is sent to the brain, for the generation of the animal spirits. Secondly, the lungs by it draw in air for the refreshing of the heart, and the generation of the vital spirits. Thirdly, smells by it are carried to *processus mammillares*. Fourthly, by it the brain dischargeth its excrements. Fifthly it furthereth the speech. Sixthly, it beautifieth the face. Seventhly, it parteth the eyes, that the one should not see the other, which would have hindered the sight. Eightly, it is a defence to them also, and stayeth the visible resemblances. Ninthly, by fleering up, it expresseth anger, so that in the Hebrew tongue it signifieth anger.

CAP.

CAP. XXV.

*Of the Lips.*

**N**OW last of all, followeth the mouth, wherein is contained the tongue the instrument of tasting. The use of it is fourfold; for it serveth for breathing, taking of food, speaking and discharging of the excrements of the brains, lungs, and stomach.

The parts of the mouth are either external, or internal: The external are the lips; these are framed of a fungious substance, and the ends of the muscles covered with the skin: They are in number two, the upper and the lower. Of the muscles of the lips, sufficient is spoken in the proper place. The lips within are covered with a membrane common to the mouth and stomach; and from hence commeth the trembling of the lower lip before vomiting. The parts which touch one another

The external parts of the mouth.

The uses  
of the  
Lips.

ther are red, by reason of the afflux of blood. The colour of these are diligently to be observed in diseases.

The uses of the lips are these: First, they serve for the convenience of eating and drinking. Secondly, for the beautifying of the face, if they be well fashioned. Thirdly, for the containing of the spittle in the mouth, that it should not run out at unseasonable times. Fourthly, to keep the gums and teeth from external injuries. Fifthly, for framing of the speech. Sixthly, for kissing.

## CAP. XXVII.

*Of the inner parts of the  
mouth.*

**T**He inner parts of the mouth are these; The gums, the teeth, the *palatum*, or roof of the mouth, the almonds, the *uvula*, and tongue. The gums, they are  
fleshy

fleshy substances, destitute of motion, appointed for the keeping of the teeth in their sockets. As for the teeth, look for them in the doctrine of bones. The roose of the mouth is vaulted, that the aire being reper- cussed, the voice may be the sharper. The skin there is wrinkled and rough, that the white hard mem- brane should the more firmly cleave to the bone, and keep the meat toge- ther while it is a chewing. Of the almonds, and *uvula* we have spoken in the discourse of the neck. The last of the inner parts is the tongue : In figure it is pyramidal; it is composed of flesh, muscles, ligaments, and the skin that covereth it. The skin that covereth it is of an exquisite sense, and proceedeth from the *dura ma- ter*. The flesh is spongi- ous, and such as is not in any parts of the body ; that it might receive the qualities of sapor, and judge of them the better. From hence it commeth, that it doth imbibe the fumes and vapors of the humours

2.

3.

4,5.

6 The tongue. Its parts.

Its motion.

Its division.

The cause of tongue-tying in children.

The vessels.

predominant in the body, which by its colour it doth declare. The tongue moveth forward, backward, to every side; it is contracted, thrust out, and doubled. Look for the muscles appointed for these motions in their proper place. Although it seem but one continuall member, yet it is divided into two parts by a line going alongst it. And in the palsey of one side of the body, one halfe of the tongue may be affected, the other remaining sound. Of the ligaments, the lower, which is called *frænum*, as in the pricke, is most remarkable: By this part, Nature sheweth that moderation is to be observed in the use of these members. If this ligament be extended to the top of the tongue, it hindereth sucking in children, so that they are said to be tongue tyed. The veins proceed from the externall jugulars under the tongue, they are called *rannulaes*, from their colour. The arteries come from the soporalls. Sinewes it hath from the third and seventh



seventh pair. The uses of the tongue, are these ; First, it is the instrument of tasting : Secondly it uttereth the speech: Thirdly, it helpeth the chewing of meat, by tossing of it too and fro , and turning it down to the stomach. Fourthly, it serveth for licking, from whence in Latin, it is called, *lingua à lingendo* from licking.

M 51

THE



THE FOURTH  
B O O K E.

A description of the  
Veins, Arteries, and  
Sinews of the Limbs.

CHAP. I.

*Of the veines of the Arms.*



*Amus subclavius*,  
or the branch of  
the *vena cava*, a-  
scending under the  
cannel-bone, when  
it is come to the  
arm-pit, it is called *axilaris*; and it  
parteth it self in two veins, the *ce-  
phalica*, and *basilica*.

The

The *cephalica* in beasts doth wholly spring from the externall jugular; but in man it receiveth only a spring from the externall jugular. Wherefore in diseases of the head, it is not without cause opened. It passeth through the upper and outward parts of the arme, to the bending of the elbow, where it is divided into two branches; of the which one, joyning with a branch of the *basilica*, makes the *mediana*. Wherefore the slope branches, which usually are opened about the bending of the elbow, are only branches of the *cephalica*, and *basilica*, which meeting, make the *mediana*. The other branch of the *cephalica* marching, according to the length of the *radius*, reacheth to the hand, through which it is spred; but chiefly that part which is between the ring-finger and the little finger.

There the *Salvatella* is placed, which is to be opened in melancholy diseases. The *basilica* passeth through

through the inner and lower part of the arm, accompanied with the artery and nerves.

About its beginning it maketh the *thoracica*, which having three or foure sprigs, and passing under *serratus major*, and the subcapular muscle, it is tyed to the upper intercostall, and about the *spina dorsi* is inosculate with the twigs of *vena sine pari. Basilica* about the bending of the elbow is divided into that which is called *subcutanea*, and that which is called *profunda*.

*Profunda* the deeper, is annexed to the artery about the bending of the elbow, not under. Then passing between the focils, it is carried to the hand by the outer part of the *ulna*.

The *subcutanea* or the shallowest branch neer to the bending of the arme, being turned up to the outer part of the *ulna*, by the length of it, is it carried to the hand.

The *Mediana* passeth to the inside

inside of the hand by the middle part of the *ulna*.

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C A P. I I.

*Of the Arteries of it.*

**R**amus *subclavius* so called, as that of the *vena cava*, when it is come to the arme-pits; it is called *axillaris*. It accompanieth the *basilica*: for there is no cephalicall. Neer to the arm-holes, it yeeldeth that artery, which is called *thoracica*, from thence being carried to the bending of the arme, it is parted into two branches, which passe to the inner side of the hand; for the outside of the hand hath neither muscles nor artery.

The one of these resting upon the *radius*, is that which is felt about the wrest.

The other marching by the *ulna* is with, its fellow, spread through the hand.

## CAP. III.

*Of the sinewes of the  
Arme.*

OUT of the perforations of the foure lower *vertebrae* of the necke, and of the first two of the backe, sixe sinewes spring, which by the muscle called *scalenus*, are carried under the cannel-bone to the arme-pit, where they are twisted together; from these the four uppermost, accompanying the *basilica* and the artery under the *deltoides* muscle, are scattered through the inner side of the arme. The fifth and sixth, turning up under the *rotundus major*, are inserted into the hindermost muscles of the shoulder-blade. Four remain, which passing along the arm are spred into the elbow and hand.

The first being carried under the inner side of the *biceps*, doth joyn it selfe with the *cephalica*.

The second being undivided and thicker,

thicker, goeth down to the bending of the elbow, being covered with fat, and there is under the artery and the *basilica*; but about the wrist it is above the vein. About the wrist it is divided into ten branches, imparting to every finger two sprigs, which pass along the sides.

The third being entire also, is carried all along the elbow by the wrist to the little finger: where divided into four twigs, it is bestowed upon the outside of the hand.

The fourth being thickest of all, is carried from the artery and veins by the backside of the arm to the *radius*; where being joyned with the *Cephalica*, it endeth at the wrist.

#### CAP. IV.

##### *Of the veins of the Foot.*

THE crural vein sendeth a branch to *musculus triceps*, called

called *Teschia*, and is divided into four branches: of the which two are in the inside of the thigh, and so many in the outside. The one of the external is sent to the fat of the thigh, the other passing according to the length of *musculus suterius* to the ham; and from thence to the inner ankle, making the *saphena*. Of the inner branches the one lying high, is joyned with the crural artery, and passing through the outside of the ham, is carried to the outer ankle: the other lying deeper, as it passeth, bestoweth twigs to the adjacent parts, and about the ham, maketh the *poplitea*; from thence being carried between the foci by the chin of the inner ankle, it is bestowed upon the soal of the foot, as the *saphena* was upon the outward parts. The veins hath valves within like to a half moon; without they are like knots; they are most commonly two together, one on each side, leaving some distance between, partly to strengthen the



the coats of the veines, partly to rule the motion of the blood.

The arteries have no valves in their progression, that the vital spirit may speedily, as the beams of the Sunne, passe to the furthestmost parts.

# C A P. V.

## Of the Arteries of the foot

**A** *Rteria cruralis*, or the crurall artery, a little below the groyne, doth send two branches through the muscle *triceps* to the *glutei*, or muscles of the buttocks. Afterward it sendeth two to the forepart of the thigh; then undivided, it passeth to the ham, where it is divided into two branches, whereof the one passeth by the side of the outward part of *tibia*, above the muscle *peroneus*, and is bestowed upon the upper part of the foot; the other entering into the *solaus*, and passing to the *pterna*, is dispersed

perfed through the foal of the foot, The *saphena* is not accompanied with an artery, and the nerve is not very neer unto it, fo that it may be fafely opened.

## CAP. VI.

*Of the nerves of the Foot.*

**F**ROM the three lowermoft *vertebrae* of the loynes, two finewes spring in the forepart of the thigh, fevered firft, and then being united, paffe to the groyne. There it is divided into five branches, compaffed with a membrane, which difperſing themſelves on every ſide into the muſcles of the forepart of the thigh, even to the *rotula*, there being, cannot be diſcerned, unleſſe the muſcle *pſoa* be rent; within the which they lye hid. Then beſides theſe, you ſhall ſee another ſmall nerve paſſing the ovall cavity of *os pubis*, to be ſpent upon the *triceps*. Through the  
back-part

back-part of the thigh, a great and thick nerve passeth framed of three, which spring out of the three upper holes of *os sacrum*, and being carried by the sinews of *os ischium*, through the inner and back muscles of the thigh, to the ham, there it is parted into two branches.

The one goeth down by the belly of the *tibia* unto the *perna*, bestowing twigs as it goeth, passing by the chin of the inner ankle to the sole of the foot, it is severed into as many branches as there are toes. The other branch marching upon the *perone*, is carried to the instep of the foot by the outer ankle. By reason of this great nerve, they who are troubled with the *sciatica*, finde pain not onely about the joynt of the thigh, but in the leg also, and foot. About the beginning of this nerve, another issueth out of the third hole of the *os sacrum*, and being carried above the ridge of the *os sacrum*, it brancheth it self into the muscles

muscles of the buttocks, and those which bend the *tibia*.

## CAP. VII.

### *Of the Nerves of the spinalis medulla.*

**I**F you invert the brain, you shall perceive four roots of the *spinalis medulla*, two from *cerebrum*, and so many from *cerebellum*: these joyned together make it up. It is of the like substance with the brain; but besides the two membranes, wherewith the *cerebrum* is compassed, this hath a third strong, and nervous proceeding either from *occipitis*, where it is joyned with the spondils; or from the ligaments of the *vertebrae*: this strengtheneth the *spinalis medulla*, and keepeth it from tearing in violent motions. From the beginning to the end it groweth narrower and harder, so that when it is come to the end of *dorsum*, it endeth

endeth in small threds like a horse tail, that no danger should be in that part where the whole *spina* is bended.

The nerves of the *spinalis medulla*, are framed of sundry filaments twisted together, and covered with a thin membrane; and as they come out of the holes of the back-bone, nature doth compass them with a thick and firm substance; which so firmly clip the *fibres* of the sinews that they cannot be severed. Besides the sinew commeth not out of that hole, directly opposite to its beginning, but out of the lower.

And when it hath passed through this hole, it doth not enter presently into the rib, which is next, but into the lower. Which when it hath touched, being divided, it turneth the lesser twig towards the *spina*, and the greater towards the fore-part. Out of this *spinalis medulla* twenty eight pairs of sinews spring, seven from the neck, twelve from the back, and five from

from the loines, and four from the *os sacrum*.

The first conjugation of the neck, doth not spring from the sides of the *spina*, as the rest; but from the fore and hinder-part, and cometh out between the *occiput* and the first *vertebra*. The fore-branch is bestowed upon the muscles of the back side of the head, and the muscles of the *vertebra* of the neck.

The second Conjugation, by the hindermost branch turned up, ascendeth to the skin of the head, the ears, and the muscles; but by the foremost branch it is carried unto those muscles, which are common to the second spondil, and the *occiput*.

The third Conjugation sendeth its foremost branch to those muscles which bend the neck: but the hindermost to the muscles which raise up the neck and head.

The fourth Conjugation sendeth its lesser and hindermost branch to the muscles of the neck; but the

the foremost and largest to the muscles which lift up the shoulder-blade and the arm.

The fifth Conjugation with its lesser twig turneth to the hindermost muscles of the neck ; and with the greater joyneth it self with the twigs of the fourth pair.

The sixth pair by the lesser and hindermost branch passeth to the hindermost muscles : but with the foremost and biggest to the arm and the *diaphragma*.

The seventh with the greater branch passeth to the arm , but with the lesser to the hindermost muscles.

As for the nerves of the back , each of them hath two branches , one lesser , which is sent to the muscles of the back ; and one greater , which is bestowed upon the intercostal muscles.

One thing is to be noted , that the sinews which proceed from the *vertebrae* of the short ribs are bigger then those which are communicate to the upper intercostal muscles.

muscles. Those about the middle of the rib are divided into two twigs; whereof the uttermost is carried outward, but the innermost inwardly along the rib. These nervs were to be biggest, because they are distributed both to the muscles of the belly, and to the parts contained in it.

As for the nerves of the loynes, each paire of these hath anterior and posterior branches, which are spent partly upon the muscles of the loynes, and *hypogastrium*; partly upon the legs. The *lumbares nervi*, or sinewes of the loines, meet, and are mingled with the *costales*. Whereby it commeth to passe, that the parts which are contained within the *peritoneum*, have their strength from the *spinalis medulla*, as their sense from the braine: for according to *Galen*, cap. 5. lib. 16. de us. part. the costal nerve is a sprig of the sixth conjugation.

As for the nerves of *os sacrum* the first paire hath two branches, as those of the loynes; to wit, the  
anteri-



anterior and posterior ; but the rest of the paires before they come out, are double on each side : and on each side one nerve marcheth forward and another backward. The uppermost three , which are anterior, go to the leg : The two lowermost passe to the muscles of the *anus* and bladder.

N

The

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## The explication of the Third Figure.

1. *The musculous skin of the Head.* 2. *The muscles of the Arm.* 3. *The muscles of the Brest.* 4. *The muscles of the Belly.* 5. *The muscles of the thigh.* 6. *The muscles of the Legs.*

This Figure is to be placed before the first Chapter of the Treatise of the Muscles.

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THE FIFTH  
B O O K E.

Containing  
A Treatise of all the Mus-  
cles of the Body.

CHAP. I.

*The description of a Muscle.*



Muscle is a dissimi-  
lary part, framed  
of its proper mem-  
brane, a fibrous  
flesh, a tendon,  
veins, arteries, and  
nerves, appointed by nature to  
be the instrument of free motion.  
The parts then are either com-  
mon, or proper. The common are  
three: The vein, the artery, and the  
nerve.

The de-  
scription  
of a mus-  
cle.

The  
parts  
constitu-  
tive.

Veins.  
Arteries.  
Nerves.

The flesh

The  
fibres.

The  
fibres  
spring  
from the  
Nerves  
accord-  
ing to  
Galen.

nerve. The proper so many ; the fibrous flesh , the membrane, and the tendon. The veins afford nourishment, the arteries life, and the nerves motion. These spring either from the brain; or from the *spinalis medulla*. It is implanted either in the beginning, or about the middle of the muscle. The nerve as soon as it hath entred into the substance of the muscles, like unto a shrub , it is dispersed into a number of twigs, which at the last end in it , and become inconspicuous. The fibrous flesh is extended onely according to the straight position of the *fibre* ; whereas the flesh of the other parts hath no certain position. The fibres of every muscle are always straight : wherefore the muscles of the belly have not their denomination from their fibres, for they are all straight ; but from position and situation : so that the muscle called *masseter* is accounted double, seeing it hath two sorts of fibres, one lying upon another. Every muscle

muscle hath a proper membrane ; It is so , more properly named then a coat : for veins and arteries are properly said to have coats. The membrane doth either spring from the tendon, or is framed by nature in the very first conformation of the parts. The last proper part of the muscle is the tendon. It is a similiary body, framed of the seed of a sinewy-like substance, onely (for it hath a peculiar substance differing from a sinew) white with a kinde of brightness, thick, hard, and smooth, extended according to the length of the muscle. It is ten times bigger then a nerve : It beginning at the head of the muscle, passeth through the belly of it, and endeth in the tail, as manifestly appeareth in the foot of a Cock. All muscles which are appointed for the moving of bones, have tendons ; but those which move other parts, as the tongue, lips, bladder, and the *anus*, seldom have. It is said to spring from the bone ; this is to be understood by

The Membrane.

The tendon.

Which muscles have tendons. How it springs from the bone.

It is the principal part of a muscle.

From whence it hath its motive faculty.

Its material cause.

reason of its insertion, but not production. It is the principal part of the muscle, and not the fibrous flesh: first because it onely hath strength to lift up the bones: secondly, because it onely is fit to contract it self, whereas the loose and soft flesh is neither able to lift up the bones, nor to contract it self. Thirdly, because there is not such a part in all the rest of the body. It hath its motory faculty from the nerve by influence, as the load-stone draweth the iron, and the cramp-fish doth benumme the hand of the fisherman by the pole. It is framed by nature of the seed in the first conformation, and not of the nerve and ligament mingled together: First, because a nerve being somewhat soft, will not admit commixt on with the ligaments, being hard. Secondly, because the nerve is not carried to the tendon, but doth end into inconspicuous threds. Thirdly, Ligaments are insensible, but tendons are of exquisite sense; as appear-

appeareth by the great pain which ensueth if they be pricked. Fourthly, because the ligaments of the bones have the composition of membranes: for they are made of straight and transvers fibres, as a web; whereas the tendons have only straight fibres. The tendon beginneth at the belly of the muscle, for there it is bigger & stronger than in the head or taile. The tendons are sometimes round, as in the *musculus biceps*; sometimes membranous, as in the muscles of the belly. These are the parts constitutive of a muscle. It hath besides these, parts derived from the position; and those are three: The head, the belly, and the taile. The head is the beginning, this is in the part unto the which the muscle is contracted: the belly is the thickest parte, the taile is the ending of it, and it is inserted into the part which is moved. It is called *ἀκροστέγιον*, and commonly *Tendo*. The substance of the tendon in all these parts is uniforme.

Its beginning.

The figure of tendons.

The parts from the position.

The use  
of a mu-  
cle.

The  
divers  
parts of a  
muscle.

The use of a muscle was set down in the last part of the description, in that it was said to be the instrument of free motion, and not voluntary, because beasts have muscles, unto whom will is denyed, because it presupposeth reason. A muscle in motion preformeth that which a leaver doth, when as such a heavy weight is to be lifted up, which cannot be done with the hands only. Seeing in every organicall part there are foure kinds of parts (according to *Galen*, 1. *de us. part.* c. 8.) The tendon is the principall part, which is sometimes altogether united, sometimes divided. The nerve is that part without the which the motion cannot be performed. The flesh bettereth the action. The rest of the parts help and further it.

CAP.



## CAP. II.

*Of the differences and action  
of Muscles.*

THE differences of muscles are taken from sundry things: First, from their substance: so some are fleshy, as sundry of the tongue and *larynx*: some are membranous, as the *constrictores* of the nose: and some are partly fleshy, and partly nervous, as the temporal. Secondly, from the quantity. The greatest of all is the first of those which extend the breast; for it doth ascend from the end of *os sacrum* to the first *vertebra* of the *thorax*. The least of all is the internal muscle of the ear; the rest are of a mean bigness, and come neer either to the biggest or the least. From the quantity, the muscles, are called either long, broad, or thick. Thirdly, from the situation: from hence some are called external, some internal, some

From  
whence  
the differences of  
muscles  
are taken

The  
greatest  
and  
smallest  
muscle.

The  
causes of  
the unity  
and plu-  
rality of  
muscles.

oblique, some straight, some transverse. Fourthly, from the figure: as *deltoides*. Fifthly, from their beginning: so some proceed from bones, some from cartilages, as those of the *larynx*; some from tendons, as the *lumbricales*. Sixthly, from the variety of parts; so some are called *bicipites*, having two heads. Seventhly, from their composition; so some are single, some double; because some have more heads, some more tails. The unity of the membrane and belly, which wrappeth the muscle, causeth the unity of it; and the plurality of the membranes and bellies, the plurality of the muscles. Eighthly, from their action: Four differences of muscles are taken from hence: for first, some are hence called *fraterni*, or *congeneres*, brotherly; some *antagonista*, adversaries. Secondly, some onely move themselves, as the sphincters; some other parts, as the rest. Thirdly; some have one onely action, as the greatest part of the muscles; some

*Fig. v.*



have divers actions, as the *nasseter* and *trapezius*. The fourth difference is taken from the variety of the action; so some are called *flexores*, some *extensores*, some *rotatores*, some *supinatores*.

As for the proper action of the muscle, it is nothing else but the contraction of it towards its beginning.

Now two things ensue after this contraction; for first, the part into which the muscle is inserted, must be apt to move: secondly, it must be drawn towards the beginning of the muscle. The diversity of the action proceedeth from the diversity of the situation of the muscles: so a straight muscle hath a straight motion; a transvers, a transvers motion; an oblique, an oblique motion; and that which compasseth a part, hath an orbicular motion, as the spinters. Now of the motion of the muscles there are four differences; first, the contraction: secondly, the perseverance of the contraction: thirdly the

The proper action of a muscle.

The cause of diversity of the action.

The difference of the motion of muscles.

*Motus tonicus.*

The efficient cause of the motion.

A description of a muscle from its action.

the relaxation of the contraction: and fourthly, the perseverance of the relaxation. this perseverance is called *motus tonicus*, when as the member is still kept in the same posture; which is performed by that faculty which governeth the body. The efficient cause then of the action is the soul, moved by its appetite. It useth three instruments, the brain, the nerve, the muscle: the brain receiveth the charge, the nerve carrieth it to the muscle, and the muscle doth perform the action; so that a muscle from the action may thus be described; a muscle is an organical part of the body, appointed for the free contraction of it self towards its beginning, for the moving of the part into the which it is inserted.

## CAP. III.

*Of the muscles of the Eye-lids*

**E** Ach eye lid hath foure muscles: the first is *frontalis*, to lift it up; the second is *orbicularis major*, or the larger round muscle under the frontall: the other two are called *Ciliares*, or of the eyelids: In each of them there is one to shut the eye-lids. The motion of the upper is manifest, but of the lower obscure. In breadth they exceed not the breadth of the cartilage. To shew the frontall you must divide the skin of the forehead where the haire beginneth, untill you come to the eye-brow. *Orbicularis major* lieth under the frontall, and appeareth when the skin of the eye-brow is removed. The *Ciliares* compasse the eye-lids orbicularly.

The occipitall, or nowle-muscles, meet with the frontalls, or those of the forehead, in the upper part.

part. The occipitalls begin on each side of the nowle, and marching upwards by a broad and membranous tendon to the eares, meet with the frontalls. If these be very fleshy, they are able to draw back the whole skin of the head.

## CAP IV.

*Of the muscles of the Eye.*

The  
straight  
muscles.

These are in number sixe; foure straight, and two oblique. The first of the straight is called *attollens*, or *superbus*; that which pulleth up the eye. The second is *deprimens*, or *humilis*, that which draweth downe the eye. the third is *adducens*, or *bibitorius*, that which pulleth the eye to the nose. The fourth is called *abducens*, or *indignatorius*, that which pulleth it from the nose.

The be-  
ginning,  
and in-  
sertion  
of them.

All these spring from the cavity of the bone, making the orbit of the

the eye about the hole of the optick nerve ; and being compassed with much fat , passing under the *conjunctiva*, end by a broad , but thin *aponeurosis*, in the *cornea*, or horny membrane, where it beginneth to be clear.

The oblique muscles are called *circumagentes*, winders about, and *amatorii*, or love-makers, and are in number two ; the first is *obliquus major*, seu *superior*, the uppermost and largest. This beginneth within the orbit of the eye , by the hole of the optick nerve , and passing to the upper part of the great corner of the eye, endeth in a small tendon , which passeth through a transvers cartilage there placed , as a cord through a pully , and is inserted into the upper side of the *cornea*. The second is *obliquus minor*, or inferior , the lowermost and smallest. This springeth from the lower , and almost outer part of the orbit , about the chunk , which doth unite the bones of the upper jaw-bone,

The  
oblique  
muscles.



bone, neer to the glandule, and passeth obliquely to the outer corner of the eye, and in the upper meeteth with the tendon of the other oblique muscle. This bringeth the apple of the eye to the nose, as as the other draweth it from it.

Before you shew the muscles of of the eye, cut off the fat with the cissars; then shew first the *obliquus major*, then the *obliquus minor*, and last of all the four strait muscles. Nevertheless, let the *obliquus major* remain last; when all the rest are taken away, that you may shew the tendon of it passeth through the pulley the more plainly.

## CAP. V.

*Of the muscles of the Nose.*

THE nose hath six muscles, whereof there be *erectores*, or raisers upwards, two; one on each side of the nose. They begin where the

How these muscles are to be shewed.

The raising up muscles.

the hole is under the glandule; and so cleaving to the bone, are outwardly inserted and carried to the *Pinna*, or sides of the nose.

There are two also called *dilatores*, or openers on each side one, which dilate the nostrils, not raising up the nose. They are like to a leafe of the myrtle tree. They have their beginning from the bone of the upper jaw, neer to the sides of the nose, and being placed about the cartilage, end in the top of nose, called *pirula*, the tip.

There be also two *constrictores*, pullers together of the nostrils. These are small and membranous, hid under the membrane which covereth the inside of the nose. They have their beginning where the bone of the nose endeth, and are implanted in the inner side.

The stretching muscles.

The pullers together.

## CAP. VI.

*Of the muscles of the lips.*

The  
common  
muscles.

1.

THE muscles of the lips are either common to the cheeks and lips, or proper onely to the lips. The common are two; the first is *zygomaticus*, or *detrahens quadratus*: this is a thin muscle, resembling a membrane, enterlaced with fleshy fibres. This hath its beginning from the *vertebra* of the neck in the outer side, the shoulder-blade, the cancell bone, and the breast-bone, and mounting up by oblique fibres to the face, is implanted in the chin, where the two lips are joyned: this muscle doth draw the cheeks downward. The second is called *buccinator*, or *bucco*; this lieth under the former, in the upper part of it. It doth make up all that part of the cheek which is blowne up when a trumpet is sounded. This springing from the brimmes of the upper jaw-bone circu-

2.

circularly, doth end in the brims of the lower jaw-bone. It is wholly membranous, and interlaced with divers *fibres*, and is so covered with the membrane which covereth inwardly the mouth, that it hardly can be severed from it. When this muscle is contracted, it is turned inwards, and so it turneth in the meat which hath escaped the teeth; and so when the meat is chewed, it is kept inwardly by the tongue, and outwardly by this muscle, that it escape not from the teeth.

Now the muscles proper to the lips, are four pair: First, *par attollens*, which beareth up the upper lips. This springeth from the first bone of the upper-jaw: where the apple of the cheek is, there it is broad and fleshy: from thence marching obliquely to the forepart, it is inserted into both the sides of the lips neer to the nose. The second is *deprimens*, which pulleth down the lower lip. It springeth from the sides of the chin,

The proper muscles.

1.

2.

- chin, where two small bunchings are: there it is fleshy; from thence marching obliquely, it is inserted into the middle of the lip: it is everywhere broad. The third pair is *abducens*, or drawing the lips to the sides. It ariseth fleshy and round from the hollowness which is under the *maxilla*, and being lapped with much fat, it is inserted into those places, where both the lips are joyned together.
4. The fourth is *corrugans*, or *constrictens*, that pair which purseth the lips together. It is called also *osculatorium*, or the kissing pair, which draweth the lips together when we kiss. This pair is framed of a fungous fleshy substance, having orbicular fibres, as the *spincter* hath. The ends of both the lips are made up of these, which appear red if we be in health, but pale if we be sickly.

## CAP. VII.

*Of the muscles of the lower jaw.*

THE lower jaw is moved upwards, downwards, towards the right side, towards the left side, and towards the back-part. To procure these motions five pairs of muscles are appointed: The first is called the *temporale*. This doth spring from all the the hollowness of the bones of the Temples, by a broad fleshy, and semicircular beginning, and by degrees becomming narrower; and being carried under the yoke-bone, it is inserted into the progress of the lower jaw-bone by a strong tendon. This tendon is dispersed through the whole muscle. The *fibra* pass from the centre to the circumference. This muscle is covered in its upper part with the *pericranium*; but in the lower part it is bare, and rested upon the bare *cranium*. Wherefore if this muscle  
be

Why the wounds of the temporal muscle are dangerous.

be wounded, fearful symptoms ensue, partly because the tendon passeth through the whole muscle: partly because it is covered with the *pericranium*. This muscle forcibly pulleth up the lower-jaw, and so shutteth the mouth, and springeth from *os frontis*, *os syncipitis*, *temporum*, and the *sphenoides*. The second pair is called *deprimens digastricum*, or *biventre*, because it hath two bellies, between which a tendon lieth: this doth pull down the jaw, and so openeth the mouth; It hath its beginning from the processes of the veins of the temple, called *Styloidei*, where it is nervous and broad; and afterward becoming fleshy, small, and round, it passeth downward, and is inserted into the inner fore-part of the jaw-bone, which is under the chin, and somewhat rough. The third is called *masseter*, because it serveth for chewing by moving the jaw to the right and the left side: from its situation it may be called *laterale*.

Its be-  
ginning.

1.

2.

4.

*laterale*. This hath two beginnings: One is nervous springing from the future where the first bone of the jaw is joyned to the fourth. This beginning is large, and strong: the other beginning is fleshy, proceeding from the *os jugulare*, and so marcheth towards the chin, and is implanted into the whole largeness of the lower jaw strongly. The fibres of this muscle, by reason of the two beginnings crosse one another; so that these muscles doe not onely move the jaw laterally, but backward and forwards also.

The fourth paire is called *pterygoideum externum*, *aliforme externum*. or *pterygoideum abducens*. This being in its beginning strong and partly nervous, and partly fleshy, doth spring partly from the upper externall sides of the winglike processes, partly from the rough and sharp line of *os cuneiforme*: then marching by straight fibres, it becommeth greater. It is inserted by a strong tendon



5.

tendon into the internall laterall part of the jaw, which is under the tendon of the temporall muscle. This moveth the jaw forward, which appeareth when the lower teeth are placed above the upper. The fifth paire is termed *maxillam adducens*, or *pterigoideum internum*. This draweth the jaw towards the head, or backward. This, in the beginning being thicke and nervous, doth spring from the inner cavity of the wing-like processes; then becommeth fleshy, large, and thick; marching by a straight passage, it is inserted into the lower jaw by a nervous, broad, and strong tendon, in the inner and hinder part of the jaw, about the cavity where the nerve entreth, where some asperities are found.

## CAP. VIII.

*Of the Muscles of the Eare.*

THE ear is moved, though obscurely, four manner of ways: viz. upwards, downwards, forward, and backward. The muscles which move the ear are either outward or inward. In the outside there are four pair. The first pair is called *attollens*: this is nothing but a portion of the frontal muscle, which is carried above the temporal muscle, and is inserted into the upper part of the ear: It is thin and membranous in the beginning, about the ending of the frontal muscle, and becomming narrower, it goeth down to be inserted into the upper part of the ear. The second is *deprimens*, or puller down: This springing from the *musculus cutaneus* above the *parotoides*, broad, fleshy, and sometimes fibrous; and afterward becomming narrower,

The outer muscles, four pair.

rower, is inserted by its tendon into the root of the cartilage of the ear. The third is *abducens ad interiora*, whereby the ear is drawn forward: This is but a particle of the *musculus quadratus*, which pulleth down the cheeks. This ascending with its fibres, is implanted into the root of the ear. The fourth is *abducens ad posteriora*: this hath its beginning in the back-part of the head, from the tunicles of the muscles of the nowle, above the *processus mamillares*: being there but narrow, it is carried downward transversly, and is inserted into the ear behind. In the inner part of the ear there are two, found out by *Aguapendente*, and *Julius Cofferius*. The first is called *externus*: it is small, springing from the skin and membrane which cover the passage of the ear; then becoming fleshy, it marcheth by a short tendon to the outer part of the *tympanum*, and is inserted about the centre of it, where within, the *malleus* or hammer

The  
inward  
muscles  
two.

hammer is tyed to it. The second is called *internus*: this is smal, and placed within the *os petrosum*. It hath its beginning in the *basis* of the wedg-bone; then becomming somewhat fleshy, and after the midst of it narrower, it is divided into two small tendons; whereof the one is inserted into the upper proceſſe of the *malleus*, and the other into the neck of it.

## C A P. IX.

### *Of the muscle of the Tongue.*

**T**HE tongue hath foure paires of muscles, by the which it is moved according to all the differences moving by a wonderfull volubility. The first is *geneoglossum*: this pulleth the tongue without the teeth and lips. It springeth from the ruggednesse which is seen in the middle of the lower jaw, in the lower part of it, and is inserted into the root of the tongue.

tongue, The second is *Myloglossum*; this helps the former. This springeth from the inner part of the lower jaw, where the farthest grinding teeth are; and about the root of the tongue it is inserted into the ligament, by the which the tongue is tyed to the throat. The third is called *Hypsiglossum*, or *retrahens*. This rising from the middle and upper part of the bone of the tongue fleshy, marching alongst the tongue, it is inserted into the middle of it. This draweth the tongue inward when it is contracted. The fourth is called *ceratoglossum*, or *Styloglossum*: by this it is drawne towards the sides. It ariseth from the *styloides processus* of the bone of the tongue, by a fleshy, small, and sharp point; then becomming broader, it is inserted into the sides of the tongue.

## CAP. X.

*Of the Muscles of the bone of  
the tongue.*

**T**His bone is moved upwards, downwards, forward, backward, and toward the sides, as the tongue is; because it is the foundation of the tongue, and the muscles of it serve for the motions of the tongue, and of the *larynx* also, when as the *larynx* and tongue are lifted up, and let down when we swallow. To performe the former actions, it hath foure paire of muscles. The first is called *Sternohyoideum*: this springing from the upper, but inner part of the *sternum*, and marching by the winde-pipe, is inserted into the root of the *hyoides*. The second is opposite to this, and is called *genihyoideum*: this springing from the inner part of the chin, fleshy, broad, and short, is inserted into the root of the bone, where a

cavity is to receive it. The third is *Coracobyoideum*: It riseth at the first small and long, but fleshy about the neck, and the Crowes bill-like pro-  
 cess of the *scapula*; and passing under the *levator* of the shoulder-blade, called *musculus patientia*, it is inserted into the point of the *hyoides*: it hath two bellies, and is very long. The fourth is *styloceratohyoideum*: This riseth from the root of the *processus styloides*, and endeth in the points of the *hyoides*.

## CAP. XI.

*Of the muscle of the larynx.*

THE muscles of the *larynx* are either common, or proper. The common are foure; two called *bronchii*, and as many called *hyothyroides*. The *Hyothyroides* doth lift up the *larynx*. This springeth from the whole *basis*, almost of the bone of the tongue, and is im-

The  
common  
muscles

implanted into the external middle part of the *thyroides*, or buckler-like cartilage. *Bronchius* pulleth down the *larynx*: This springing from the inner part of the *sternum*, mounteth up to the *basis* of the *thyroides*, by the pipes of the *trachea arteria*. This muscle with its fellow raiseth up the length of the wind-pipe in beast and fowles, which have a long neck. The proper muscles are in number five. The first, is *Cricothyroides anticus*: this dilateth it. This springeth from the fore and external part of the ring-like cartilage, and is inserted into the lateral part of the *Thyroides*. The second is *Cricothyroides lateralis*. It purseth together the *thyroides*. It springeth from the lateral parts of the *cricoides*, and is inserted into the external lateral parts of the *thyroides*. The third is *Cricoarytenoides posticus*: this openeth the warlike cartilage. This passeth from the back part of the *cricoides* to the *aritenoides*. The fourth is *Thyroa-*

The proper muscles.



*rytenoides*, or *glottideus*: this helpeth the former, and springing from the inner and fore-part of the *thyroides*, is inserted into the lateral parts of *artenoides*. The fifth is *Artenoides*: this is a round muscle, compassing the ewar-like cartilage.

## CAP. XII.

*Of the Muscles of the uvula  
and throat.*

THE *Uvula* hath two muscles to hold it up: for it is pulled down by the weight of the meat as it passeth by it. The first is *Pteristaphilinus externus*: this springeth from the upper jaw, a little below the furthestmost grinder, and is inserted into the side of the *uvula*. The second is *Pteristaphilinus internus*: this proceedeth from the lower part of the internal wing of the *pterygoides* processes, and is inserted into the *uvula* in like manner.

*The*

The throat or the beginning of the *œsophagus*, called *pharynx*, hath seven muscles, to wit, three paires, and one without a paire. Of the paires, the first is *sphenopharyngeus*: this springeth from the sharpe point of the *sphenoides*, neer to the *styloides* processes; and passing downward, is inserted into the lateral parts of the throat, to pull up the mouth of the stomach. The second is *Cephalopharyngeus*. It springeth from that part where the head is joyned to the neck, and marching downe it is spread about the *pharynx*, and seemeth to make the membrane of it. The third is *stylopharyngeus*: This springing from the *styloides* processe, is laterally inserted into the *pharinx* to dilate it. That which hath no match is called *œsophagus*: this springing from one side of the *thyroides*, and circularly compassing the hinder part of the *pharynx*, it is tyed to both the sides of the *thyroides*, to contract the mouth of the st-

make, as the *sphincter* doth the *anus*.

### CAP. XIII.

*Of the muscles of the head.*

The  
common

The pro-  
per.

THE muscles of the head are either common or proper. *The common* are those which together with the neck move the head: these are the muscles which move the neck. *The proper* are those which onely move the head when the neck remaineth immoveable: these are in number fourteen, or seven paire. First, two *mastoides* bend the head forward. These beginning in the upper part of the *sternum*, and the middle of the *cannell-bone*, are inserted into the proesse, called *mastoides*, obliquely. These are placed in the forepart; behind twelve or six pair are placed. The first is *splenicus*, or *triangularis*: this proceeding from the sixth *vertebra* of the brest, and

mar-

marching to the third *vertebra* of the neck, is inserted into the *occiput*. The second, *Complexus*, or *trigeminus*. This springing from the transvers processes of the same *vertebra*, is inserted into the *occiput*. The third, *recti majores*, two: these springing from the edge of the second spondil, are inserted into the *occiput*. The fourth, *recti minores*, two: these lye under the former, proceeding from the back-part of the first spondil, end into the *occiput*. The fifth *obliqui majores*: these springing from the *spina* of the second *vertebra*, reach to the transvers process of the first *vertebra*. The sixth, *obliqui minores*, under; these proceeding from the same beginning, are carried to the *occiput*. The oblique muscles turn about the head: the other muscles extend it.

## CAP. XIV.

*Of the muscles of the Neck*

THE neck hath eight muscles, four on each side: for it is extended by two pair; *Semispinatum*, and *transversarium*. *Semispinatum*: this proceeding from the *spine* of the upper seven *vertebrae* of the breast, and five of the *vertebrae* of the neck, is inserted into the edge of the second *vertebra* of the neck. *Transversarium*: this rising from the transvers processes of the sixth upper *vertebra* of the back, is inserted outwardly into all the processes of the *vertebrae* of the neck. It is bended by four muscles, two on each side; to wit, first, *longus*: this being placed under the *œsophagus*, doth spring from the third *vertebra* of the back, and mounting up, it is tyed to all the *vertebrae*, and endeth in the fore process of the first *vertebra*. The third

third is *par spinatum, triangulare, scalenum*. It proceeding from the first rib, is inserted into all the transverse fibres of the neck, by oblique fibres internally. It is perforate to make way for the veins, arteries, and nerves which pass to the arms.

CAP. XV.

Of the muscles of the Brest.

**F**irst of all, these dilate it. The first is *Subclavius*: this ariseth fleshy from the inner part of the *clavicula*. and is inserted into the first rib, neer to the *sternum*. The second is *serratus major*: this doth arise from the inside of the shoulder-blade, and the two upper ribs, and is inserted into the lower five true ribs, and two upper short ribs. The third is *serratus posticus superior*: this lying under the *rhomboides*, springeth from the edges of the three lower *vertebra*

The dilaters.

1.

2.

3.

of

4.

of the neck, and from the edge of the first *vertebra* of the back nervous, and is inserted into the three upper ribs. The fourth is, *serratus posticus inferior*: this ariseth from the edges of the three lower *vertebra* of the back, and of the first *vertebra* of the loins, and is inserted into three or four lower short ribs.

5.

Fiftly, *The eleven external intercostals*, which perform the office but of one muscle. These spring from the lower part of the upper rib, and are inserted into the upper part of the lower rib obliquely, and forward.

The contractors.

1.

These that follow contract the brest. First, the *triangularis*: this arising from the inward and lower part of the *sternum*, is inserted into the cartilages of the two upper ribs. This as a pillow receiveth the upper part of the heart. The second is *sacrolumbus*: this arising from the *os sacrum*, and the sharp processes of the *vertebra* of the loins, endeth in the upper ribs, about

2.

about their beginnings, bestowing upon each rib a tendinous latch. Thirdly, *the eleven internall intercostals*, which are as one muscle. These passe obliquely from the lower to the upper rib, filling the distance: their fibres are opposite to those of the externall, representing a Saint *Andremes Crosse*. These serve for violent breathing, being seconded by the oblique muscles of the belly.

3.

*Diaphragma*, or *septum transversum*, is the instrument of free motion. The head of it is in the centre, but the tail in the circumference of the lower short ribs. For from the fourth short rib to the last, cleaving to the brims of them, it passeth by double or triple fleshy and tendinous productions to the twelfth *vertebra* of the back, and from thence to the third *vertebra* of the loines.



## CAP. XVI.

*Of the muscles of the Loins*

THE backe doth not move for want of muscles, and by reason of the ribs between the neck and loines, whilst the outward parts are moved. Onely the last spondill of the back is moveable; for it doth not receive, but is received both above and under: but seeing it is annexed to the loines, the motion is rather to be ascribed to the loines than to the back. *The loines* are bended by two muscles called *flexores*; there is one on each side. They spring from the hinder part of the edge or brim of the flank-bone, and inner laterall part of the *os sacrum*, and march by the transverse processes of the *vertebrae* of the loines, fleshy to the last rib.

They are extended by foure muscles; whereof there are two in each side. These are so wrapped to-

Benders.  
two.

Extend-  
ers four.

gether according to the length of the *spina*, that they may seem either to be as many pairs of muscles as are spondils, or one onely pair giving tendons to the *vertebra*. The first is *semispinatus*; this springeth by a nervous beginning from all the *spina* of the *vertebra* of the loins, and *os sacrum*, and ends in the transvers processes of the *vertebra* of the loins, and all those of the brest. The second is *sacer*: this ariseth by a sharp and fleshy beginning from the hinder part of *os sacrum*, and is inserted into the roots of the *spina* of the spondils of the back. If these four muscles conspire together, they keep the *spina* immoveable: but if those of the one side do onely move, it is drawn to one side.

## CAP. XVII.

*Of the muscles of the Abdomen.*

**I**T hath ten muscles ; five on each side. The first is *obliquus descendens* : this being parted into seven or eight fleshy portions, whereof the three greatest are finger-like inserted into *serratus major* , it springeth from the lower side of the sixth, seventh, eighth, and ninth lower true ribs: then going down obliquely, it cleaveth to the bended part of the outside of the *os ilium* , and to the edge of *os pubis* ; then it endeth by a broad tendon in the *linea alba* . Wherefore it hath its beginning both above and below, but ending in *linea alba* . The second is *obliquus ascendens* : this ariseth from the sharp point of *os pubis* , and from the top of the whole bending of *os Isthium* , and cleaving to the four lowermost short ribs, by a double tendon, clipping the straight muscle,

muscle, it endeth in the *linea alba*. The fibres of this being opposite to those of the former, represent a Saint *Andrews* Crosse. The third is *rectus*; this ariseth from the lower part of the *sternum*, about the *cartilago xyphoides*, fleshy; or rather from the cartilaginous ending of the ribs: and marching along the belly, it is inserted into the brim of the *os pubis*, by a thick and nervous tendon. It hath three intersections, which some accompt severall muscles; two are above the navel, and one even with the navell. If the fourth be found, it is placed under the navel. These intersections first strengthen the muscle, as knots doe reeds. Secondly, they further the extension of it in violent motions: so Tailors, to cause a cloath stockin to stretch and sit close, cut the cloth bias. The fourth is the *pyramidall*: this is placed above the lower part of the *musculus rectus*. It springeth from the *os pubis*. Most commonly there is found one in each

each side. Sometimes they are so united that they seem one broad muscle; sometimes they are altogether wanting, and then the ending of this is fleshy, whereas otherwise it is tendinous. These strengthen the ends of the *musculi recti*. The fifth is the *transversus*: this arising from the transverse processes of the *vertebrae* of the loines, below it is tyed to the arch of the hanch-bone, but above to the inner part of the short ribs; and passing from thence to the *cartilago xiphoidea* under the straight muscle, it endeth by a broad tendon in *linea alba*. This *linea alba* beginning at the *cartilago ensiformis*, passeth directly by the navell to the joyning of the *os pubis*. It is framed of the membranous tendons of all the muscles of the belly, the straight excepted. But seeing the tendons of the muscles of the right side are so firmly united to the left; that no signe of separation can be discerned, it is not seen but between the two straight

straight muscles. The muscles have their denomination from their situation, and the texture of their tendons. While the body is at rest, these strengthen the parts subjacent, and encrease their heat: in action, first, they further the excretion of the excrements: secondly, they help the delivery of the infant in labour: thirdly, they further strong breathing: fourthly, they bend the *spina* in violent exercises.

## CAP. XVIII.

*Of the Muscles of the Genitals.*

**P***enis*, or the Prick of Man, hath foure muscles, two on each side; The first is *erector*, or *director*: this ariseth from the inner knob of the hanch-bone, and being tyed by the side to the ligament of the pricke, it reacheth to the middle of it. The second is *accelerator*: this ariseth from the internall

internall knob of *ischium*, below the laterall ligament of the pricke, and from the *sphincter* of the *anus*, and being placed with his fellow under the *urethra*, passeth to the middle of the yard.

The *Clitoris*, or little prick in women, hath foure muscles. The two uppermost being round, they arise from the internal knob of the *ischium*, and being placed by the laterall ligaments, cause the erection of it. The two lower are broad and smooth, and proceeding from the *sphincter* of the *anus*, are inserted into the brims of the *cunnius*.

The *stones* have two muscles to pull them up : they are called *cremasteres*, from *κρημαζω*, to hold up. In health they keep the stones wrinckled, whereas in sicknesse they are flaggy, and hang downe. They are thought to spring from the fore and inner brim of the *os ilium* : but they seem rather to be the endings of the oblique ascending muscles neer to the *os pubis*; which

which compassing without the productions of the *peritoneum*, pass with the spermatick vessels towards the stone. The Cremaster in women are shorter then in men; and are placed above the production of the *peritoneum*: through this production the round ligaments of the *matrix* passeth, which in women is compassed with a fleshy substance, which resembleth the cremaster in men.

## CAP. XIX.

*Of the Muscles of the Bladder  
and Anus.*

THE Bladder hath but one muscle, called *sphincter*, it doth compass round the neck of the bladder. Above it compasseth the *prostrates*, and is seated under them also. The fibres are orbicular. If one side be taken with the palse, an involuntary excretion of the urine doth not always follow,



follow, because a nerve is implanted into the outside of the neck of the bladder. In women it reacheth to the hole by the which the urine passeth, and it seemeth to form it.

The *anus* hath three muscles. The first is *sphincter*: this is fleshy, and without the strait gut two inches broad. The fibres are orbicular. It doth not spring from any adjacent bone, but is onely inserted into the *coccyx*. The second and third are called *levator*s; they are placed within the gut, and are large and fleshy. They are tyed to the sides of the gut, and reach to the *sphincter*: they possess the distance between the *ischium* and the *os sacrum*.

## C A P. XX.

### *Of the muscles of the Shoulder-blade.*

**T**HE shoulder-blade is moved forward, backward, upward,

upward and downward. It hath  
 foure proper muscles. The first is  
 called *trapezius* or *cucullaris* : this  
 hath its beginning from the lower  
 part of the nowle-bone towards  
 the eare, fleshy : but from the po-  
 sterior processes of the *vertebræ* of  
 the necke, and the eight upper *ver-*  
*tebræ* of the brest, it springeth mem-  
 branous and broad, and is inserted  
 iato the *basis* of the *scapula*. The  
 second is *levator*, or *patientia mus-*  
*culus* : this hath its beginning from  
 the transverse processes of the first,  
 second, third, and fourth *vertebræ*  
 of the necke, which beginnings  
 being united, are inserted into the  
 upper corner of the shoulder-  
 blade. The third is *serratus minor*  
*anticus* : this springeth from the  
 foure upper ribs before they be-  
 come cartilaginous : cleaving to  
 these be foure fleshy portions re-  
 presenting the teeth of a saw, and  
 are inserted by a broad tendon  
 neer to the anchor-like processe  
 of the *scapula*. The fourth is *rhomb-*  
*oides* ; this is placed immediately

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4

5

under the *cucullaria*. This springeth fleshy from the hinder processes, or *spinæ* of three of the *vertebræ* of the neck, and so many of the brest; and is inserted by as broad a fleshy ending, as the beginning was into the *basis* of the shoulder-blade. The fifth is *serratus major*: this hath its beginning from the eight upper ribs before they become gristly. The beginnings are fleshy portions like to the teeth of a saw, by which it is inserted into the like portions of the oblique descending muscle. Then it marcheth fleshy, by the ribs upwards at the sides of the brest, and is implanted by a large fleshy end into the whole inner *basis* of the *scapula*. It moveth the shoulder-blade forward and downward. The beginning must be in the brest where the fleshy portions are; because there the nerves are inserted: and that part is steady, which the *scapula* is not.

C A P. XXI.

*Of the Muscles of the Arme.*

**T**H E arme hath five motions, for it moveth backward, forward, upward, downward, and circularly. It is moved upward by two erectors, *deltoides* and *supraspinatus*. First, *deltoides* springeth from the middle of the cancell-bone, the top of the skoulder, and the whole *spina* of the *scapula*, and is inserted into the middle of the shoulder-bone. The second is *supraspinatus*, or *super scapularis superior*: this placed in the cavity above the *spina* of the shoulder-blade, and passing under the upper part of the *scapula*, is inserted into the necke of the shoulder-bone, which it compasseth with a broad tendon. It is pulled downe by *latissimus*, and *rotundus major*. *Latissimus*, so called from its largenesse; for with its mate it covereth the whole backe. It is called

1.

2.

Depressors.

1.

*ani scalptor*, or *terfor* ; for without these this office could not be performed. This springs by a broad membranous beginning from the hinder processes of the *vertebræ* of the brest, beginning at the sixth, and reaching to the middle of the *os sacrum*, and upper part of the *os ilium* : then passing upwards, when it is come to that part of the backe where the ribs bend, it becometh fleshy, and passeth by the lower corner of the *scapula* : where becomming narrow, it is inserted under the upper end of the shoulder-bone by a short broad tendon betweene the *musculus pectoralis*, and the *rotundus detrahens*. *Rotundus major*, or more properly, *teres major*, because it is long without edges, this springeth from the whole *costa* of the *scapula*, and is inserted into the shoulder-bone, a little below the necke of it.

Movers  
forward.

I

It is drawne forward by *pectoralis* and *coracoideus*. *Pectoralis*, it beginneth from the seventh, sixth, and fifth true ribbes, the *sternum*,

*sternum*, and above the halfe of the cannell-bone, and by a sharpe tendon it is inserted into the shoul-der-bone, between the *deltoides* and the *biceps*. *Coracoides*, it beginneth at the *coracoides apophysis*, and endeth about the middle of the shoul-derbone.

2.

It is moved backward by three : *infraspinalis*, or *subscapularis*, or *immersus*, and *rotundus minor* : *infraspinalis*, or *subscapularis*, it possesseth the whole cavity of the *scapula*. It springeth from the *basis* of it, fleshy, and so continuing, passeth forward ; but becomming still narrower to the necke of the *scapula*, at the last it getteth a broad tendon by the which it is inserted into one of the ligaments of the arme. *Rotundus minor*, or *super-scapularis inferior* : this arising from the *basis* of the *scapula* by a fleshy beginning, marcheth forward ; and becomming narrower is inserted into the fourth ligament of the arme, by a broad and short tendon.

Pullers  
backward.

Note.

One thing is to be noted, that the tendon of *musculus latissimus* together with the tendon of *musculus temporalis*, cause that cavity which is seene in the cavity of the arme-pit; for the tendon of the *latissimus* frameth the inside, but that of the *temporalis* the outside of the cavity.

## CAP. XXII.

*Of the Muscles of the Ulna.*

THE elbow hath two bones, *ulna* and *radius*. The *ulna* serveth for flexion, and extension; but the *radius* for pronation and supination. The *ulna* is bended by two, to wit, *biceps*, and *brachialis internus*. *Biceps* hath two beginnings from the shoulder-blade. The first is that which is outward, tendinous and round; it springeth from the upper brim of the hollownesse of the *scapula*, and marcheth under the ligaments of the joynt,

Senders of  
*ulna*.

I

joynt, above the top of the shoulder by the chink in the bone made for that purpose, where it is wrapped by a ligament which riseth from the hollownesse. The second head is broader than the first, framed partly of a tendon, and partly of flesh; it springs from the anchorlike proceſſe of the shoulderblade; then descending by the inner part of the top of the *scapula*, it meeteth with the former; below the head of the shoulderbone, it becommeth a strong fleshy muscle: afterward ending in a thick, round, and strong tendon, it is inserted into the long knob, under the upper end of the *radius*. This is that tendon which causeth great paine if it be pricked in phlebotomy. *Brachius internus* lying under the *biceps*, rising from the middle of the shoulderbone, unto which it cleaveth firmly: it is inserted both into the *ulna* and *radius*, where they meet.

The *ulna* is extended by foure muscles, *longus*, *brevis*, *brachius*



I

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4

*externus*, and *cubitalis*. *Longus* ariseth from the lower brim of the *scapula* neer to the neck, where it hath a peculiar hollownesse; and endeth in the knop of the elbow. *Brevis* rising from the hinder part of the neck of the shoulder-bone, endeth in like manner in the *olecranon*; both these make but one strong tendon. *Brachium externus* placed under these two: it is placed upon the outside of the shoulderbone: it is confounded with the other two, and endeth where they doe, but this seemeth to *Spigelius* (*de hum. corp. fabrica lib. 4 c. 15.*) to be but a fleshy portion, arising about the middle of the shoulder, and no peculiar muscle. *Cubitalis*, or *anconus*: it is placed in the hinder part of the bending of the elbow, which is called *ἀγκών*, and answereth to the *musculus popliteus*: this ariseth from the lower and hinder part of the shoulderbone; and placed betweene the *ulna* and the *radius*, it endeth by a nervous tendon in the

the laterall part of the elbow an inch below the *olecranon*. The extending muscles have straight fibres.

C A P. XXIII.

*Of the Muscles of the Radius.*

**T**He *Radius* hath two sorts of muscles : for some are called *pronatores*, or pullers down : some *supinatores*, or raisers up. The *pronatores* are two in number : the first is, *pronator superior rotundus* : this springeth from the root of the inner knob of the shoulder-bone, and from the inner side of the *ulna*, where it is joyned to the arme-bone ; and endeth obliquely about the middle of the *Radius* by a membranous tendon. The second is *pronator inferior quadratus* : this is altogether fleshy. This springeth from the lower and inner part of the *ulna* two inches broad ; then marching obliquely above the ligament which joyneth the *radius*

The pro-  
nators.

1

2

to the *ulna*, it endeth in the inside of the *radius*. The ending is as broad as the beginning; wherefore it is called *quadratus*, or foure square.

Supinators  
1.

The *supinators* are in like manner two. The first is *supinator longus*, so called, because of all the muscles which march by the *ulna*, it hath the longest belly. This springeth fleshy from the edge of the inner knob of the *ulna*; and marching obliquely under the *radius*, is implanted by a membranous tendon into the upper part of the lower *appendix* of the *radius*, bending somewhat to the inner side. The second is *supinator brevis*: this springeth from the outward part of the ligament of the lower end of the arme-bone, and from the hinder proceſſe of the *ulna*; being without membranous, and within fleshy, it is inserted into the middle of the *radius*.

2.

## CAP. XXIV.

## Of the Muscles of the Wrist.

THE Wrist is bended by two muscles in the inside. The first is *cubitus internus*: this doth arise by a fleshy and nervous beginning from the sharp inner knob of the shoulderbone; then passing fleshy by the length of the *ulna*, it doth end by a tendon, partly nervous, and partly fleshy, in the fourth bone of the first ranke in the Wrist. The second is *brachius internus*: this arising from the same place, and passing alongst the *radius*, is inserted into that bone of the back of the hand which doth hold up the forefinger.

Two externall muscles stretch out the *carpus*. The first is *radius externus, sive bicornis*: this ariseth from the sharpe edge of the outer knob of the shoulderbone in the upper part of it, by abroad beginning: then becomming fleshy, it passeth

Benders.

1

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Extenders

1

2 passeth to the middle of the *radius*, where it becommeth a strong tendon, which presently is divided into two tendons more broad then thicke. Both these passe a little asunder by the *radius* under the ligament, whereof one is inserted into the bone which stayeth the first finger, and the other into the bone which stayeth the middle finger. The second is *cubiteus externus* : this hath its beginning from the root of the external knob of the shoulder-bone, in the upper end of it : when it is come to the wrist, it becommeth a strong round tendon, and is inserted into the upper part of that bone which stayeth the little finger, not farre from the wrist.

## CAP. XXV.

Of the Muscles of the Palme of the Hand.

THIS is thought to have two muscles. The first is *palmaris*; this

this ariseth from the inner knob of the shoulder-bone round and nervous; and placed under all the muscles, it mounteth over the *ligamentum annulare*. Then it is dilated into a broad membrane, which cleaveth firmly to the skin of the palme of the hand, for firm apprehension, and quicknesse in feeling. and endeth about the first joynts of the fingers. The second is *cero quedam quadrata*, or a four-square fleshy substance: this springeth from the *membrana carnosus* under *mons lunc*, where the eighth bone of the wrist is placed. From thence it is carried under the *musculus palmaris*, to the middle of the palme of the hand, and is inserted into the outside of that tendon which carrieth the little finger from the rest. This representeth two, or three muscles, and serveth for the hollowing of the palme of the hand, to forme *Diogenes* his cup by, bringing the fleshy eminence under the little finger to the tenar.

## CAP. XXVI.

*Of the Muscles of the four fingers,*

THE fingers are bended, extended, and moved laterally. Now the muscles which performe these motions, either belong to the other fingers, or to the thumb. The fingers are bended by two muscles. The first is *sublimis*: this springeth from the inside of the inner knob of the shoulderbone; and about the wrist it produceth foure tendons, which end about the second joynts of the fingers. These are hollow to give way by a chink to the tendons of the *profundus*. The second is *profundus*: this ariseth from the upper parts of the *ulna* and *radius* under the joynt, and being separate into four tendons, they are implanted into the third joynts of the fingers, under the *ligamentum annulare*, by the tendons of the *musculus sublimis*, under which they lye. The toes are extended by three muscles whereof

Benders  
of the  
four fin-  
gers.

1

2

Extenders.

whereof one is common, and two proper. The common is *extensor magnus* : this arising from the outer knob of the arme-bone, about the wrist, is divided into foure tendons, which end in the lowermost joynts of the fingers. The proper are two; the first is *indicator*, because it belongeth to the fore-finger. It ariseth from the outward and middle part of the *ulna*, and by a double tendon it endeth in the second joynt of the fore-finger : but one of the tendons becommeth one with the tendon of the *extensor magnus*. The second is *auricularis*, because it belongeth to the little finger. It ariseth from the upper part of the *radius*, and marching between the *ulna* and the *radius*, it is inserted outwardly by a double tendon into the little finger.

The fingers are laterally moved two manner of waies : for either they are brought to the thumb, or they are carried from it. These motions are performed by two  
sorts

Movers  
laterales.



*Interossei.*

sorts of muscles, called *interossei*, and *lumbricales*. The *interossei*, so called, because they are placed between the bones of the *metacarpium*: they are fleshy and round, and spring from the bones unto the which they are tyed: they passe straight along these bones: these when they are come to the roots of the fingers, they passe in to tendons which cleave to the sides of the fingers, and end in the second joynt by their tendon. Six are placed between the three distances, between the bones of the *metacarpium*, so that there are two between each distance: whereof one doth passe to the lower, one to the upper part of the tendon. The middle and ring finger receive two tendons, but the fore and little finger but one. The *lumbricales* are in number foure: these arise in the distances of the tendons by the wrist, and meet with the *interossei* about the first joynt of every finger. The first is inserted into the ring finger; the second & third

to the middle finger; but the fourth to the fore-finger: these are not one with the tendons of the *interossei*.

Besides these muscles, the fore finger and the little finger have one *musculus abducens*. That of the fore finger springeth from the middle of the *ulna* : then neer the wrist it is parted into two tendons which passe under the ligament. The upper is implanted at the root of the fore finger ; but the lower into the root of the middle finger. That of the little finger, called *hypothenar*, is placed in the palm of the hand under the little finger. It is short and strong ; it springeth fleshy from the fourth bone of the *metacarpium*, and is implanted by a small nervous tendon into the outside of the first bone of the little finger.

Abducing  
muscles,  
two:

# CAP. XXVII.

## Of the Muscles of the Thumb.

**T**He Thumb is extended by two muscles. The first is that which

Extenders.  
I

2

which is called *longior* : this ariseth fleshy from the outer and higher seat of the *ulna*, where the rough line is; and the membranous, which tieth together the *ulna* and *radius* : from thence it is carried obliquely to the *radius*, and before it come to the *appendix* of it, it becommeth a round tendon, which passing under the annular ligament, marcheth according to the length of that side, which is next to the forefinger, and is inserted into the third bone of it. The second is *brevior* : this extendeth the second and third joynt of the thumbe. It ariseth from the same line fleshy : it passeth obliquely above the *radius*. By one tendon it is implanted to the root of the first joynt of the thumb ; by the other becomming membranous it cleaveth fast to the second and third bone of the thumbe.

Benders.

I

It is bended by one muscle ; which springing from the inner part of the *ulna*, is implanted into the first and second joynt of the thumbe.

thumbe. This being fleshy, which *Spigelius de hum. corp. fabric. l. 4. c. 19.* divided into five muscles, together with the *abducent* of the thumb, makes up *monticulus lunæ*.

It is laterally moved by two muscles. The first is called *ibenar*, or *abducens*, this springeth from the inner part of the bone of the wrist which stayeth the thumbe, by a nervous beginning : then becoming fleshy, it is inserted into the first joynt of the thumbe by a membranous tendon : this draweth it from the fore-finger. The second is *antibinar*, or *adducens* : this is seated outwardly, in the distance betwene the thumb and fore finger. This doth arise from the outer and hinder side of that bone which stayeth the first finger ; and being fleshy is inserted into the whole inner side of the first joynt of the thumb ; this draweth the thumb to the fore finger.

*Monticulus lunæ.*  
Movers  
laterallie.

2

## CAP. XXVIII.

*Of the Muscles of the Thigh.*Benders  
forward.

2

3

**T**HE Thigh is bended forwards by three muscles. The first is *psoas*, or  $\psi\omicron\alpha$ , and *lumbaris*: that lieth in the inner part of the *abdomen*, upon the *vertebræ* of the loines. It ariseth from the transverse processes of the two lowermost spondils of the backe, and marching by the inside of *os ilium*, it is inserted into the lesser *rotator*. The second is *iliacus internus*: this springing from the inside of *os ilium*, and being joyned to the *psoas* by his tendon, it endeth before betweene the greater and lesser *rotator*. The third is *pectineus*: this arising from the upper part of the *os pubis*, is implanted a little below the necke of the thigh bone.

Benders  
backward,  
I

It is bended backward by the three *glutii*, which make up the buttockes. The first is the outermost

most and the greatest : it springeth from the *coccyx* , from the edge of *os sacrum* , and from the halfe of the bending of *os ilii* , and is inserted foure inches below the great *rotator*. The second is the middlemost : this springeth from the outer part of *os ilium* , and is inserted into the outer side of the great *rotator*. The third is the lowermost ; this springeth a little lower, from the outer part of *os ilii* , and is implanted into the upper part of the great *rotator*. It is drawne to the inside by the *musculus triceps* : this is the biggest of all the muscles of the body, and hath three beginnings, which end in one musculous tendon. The first head doth proceed from the upper part of the share-bone, and lying by the *pectineus* , is inserted into the middle of the thigh-bone. The second springing from the middle of the same bone, being lesser, is inserted a little below the necke of the thigh-bone. The third arising from the lower part of the same

2

3

Drawers  
to the in-  
side.

2

same bone, being of all the lowermost and biggest, reacheth to the end of the thigh-bone by a very strong tendon. These are inserted into the hinder line which is in the bone. *Spigelius de hum. corp. fabric. l. 4. c. 22.* addeth another, which he termeth *lividus* : this proceedeth from the fore-part of *os pubis*, where the cartilage is, which joyneth the two bones by a broad and fleshy substance. As it descendeth obliquely it becometh a large tendon, but short : and marching downe by the inner part of the thigh, it is inserted into the middle of the thigh-bone.

Turners  
toward the  
outside.

1

It is turned towards the outside by foure small muscles called *quadrigemi*. They are placed above the articulation of the thigh one by another. The first is called by others *Iliacus externus*, and from the figure *pyriformis* ; it is longer than the rest ; it ariseth from the lower and outer part of the *os sacrum*. The second ariseth from  
the

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the knob of *os ischii*. The third ariseth from the same part. These are inserted into the hollownesse of the great *rotator*. The fourth is called *quadrigenus quadratus*, more fleshy and broader than the rest : it lyeth two inches distant from the third : it ariseth from the inner part of the knob of the *ischium*, and is implanted into the outward part of the great *rotator*. It is rowled oblique by two muscles called *obturatores*. The first is *obturator internus*, this rowleth it outward : this ariseth from the inner circumference of the *os pubis*, and is inserted into the cavity of the great *rotator*. The second is *obturator externus* : this ariseth from the externall circumference of the hole of the *os pubis*, and returning by the neck of the thigh-bone, as by a pully, it endeth in the cavity of the great *rotator*, under the fourth *quadrigenus*.

3

4

Rowlers obliquely.

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2



## CAP. XXIX.

## Of the Muscles of the Leg.

Benders.

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THE shanke hath thirteene Muscles, whereof foure doe bend it. The first is *seminervosus*: this beginneth at the knop of the *ischium*, and endeth in the inner side of the *tibia*, towards the back-side. The second is *semimembranosus*: it proceedeth from the same knob, partly nervous, and partly membranous; but it marcheth by a broad tendon to the inner and hinder part of the *tibia*. The third is *biceps*: this ariseth from the same knob of the *ischium*; and being carried by the outside of the *tibia* in man, about the middle of the thigh, it becommeth fleshy; and by one tendon it is inserted into the outside of the *tibia*. That this tendon may bee the more safely carried, the thigh-bone is griped and covered with a smooth and slippery ligament, the fourth is *posticus*

*posticus gracilis*: this ariseth from the line where the share-bone and hip-bone are joyned together, and marching downe in the inner side of the thigh, it is inferred into the inside of the *tibia*. In fat persons this seemeth to be a stiffe sinew, when they stride much. The shanke is extended by five muscles. The first is *membranosus*: this proceeding from the upper part of the edge of the *ischium*, doth compasse both the thigh and the leg; wherefore it is called *fascia lata*, because it covereth all the muscles of the thigh and leg, reaching to the foot. If it be nipt by sharpe humours, great paine is caused. The second is *longus*: this ariseth from the upper and forepart of the edge of the bending of the *os ilium*, and passing by the inside of the thigh obliquely, it endeth in the inside of the leg: and because it is thought to bring in the leg, that it may be layd upon the other, some call it *sutarius*, the Shoo-makers muscle: but it may

Extenders

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be more truly called *sartorius*, the Taylors muscle; for when they sow upon their stals they sit crosse-legged. The third is *reſus gracilis*; this springing from the lower brim of the *os ilium*, and passing straight alongſt the length of the thigh, endeth in the *patella* by a broad tendon. The fourth is *vaſtus duplex*: these are placed at the sides of the *gracilis*, whereof the one is called *externus*; this springeth from the root of the greater *trochanter*, it endeth a little below the *patella*, outwardly. The other is called *internus*; this ariseth from the root of the lesser *trochanter*, and endeth in the inside of the leg, a little below the *rotula*. The fifth is *crureus*: this lieth under the two *vasti*; it springeth from the fore-part of the *os femoris*, between the two *trochanters*, it endeth in the *rotula*. These four muscles, the *reſus*, *gracilis*, the two *vasti*, and the *crureus*, meeting about the knee, become one strong tendon, which covereth the *patella*.

On

One thing is to be noted, that the muscles which extend the leg are stronger then those which draw it in, that the weight of the body may be the better upholden when we stand. To these we may adde that muscle which is called *popliteus*, or *suppliteus*, which moveth the leg obliquely : this lyeth in the hollow of the ham, above the head of the *soleus* : it springeth from the outer knop of the thigh-bone, and is inserted in the upper and hinder part of the leg, which it clippeth firmly.

7.

## CAP. XXX.

*Of the muscles of the Instep.*

THE Instep is bended when it is drawne upwards. To performe this motion it hath two : the first is *tibialis anterior* : this ariseth from the upper *epiphysis* of the *tibia*, neere to the *fibula*, and cleaving unto the whole *os tibiae*, about the middle of it, it becom-

Benders,

meth a tendon, which passing under the annular ligament of the Instep, is divided in two tendons; whereof the one is inserted into the first of those bones which are called *innominata*, without a proper name: the other is inserted into the bone set before the thumb.

2

The second is *peroneus anterior*: this ariseth from the outer and middle part of the small focill, and being carried through the chinke of the outer ankle, it is inserted into the bone of the Instep, which stayeth the little toe: it hath two heads and two tendons. The foot is extended when it is drawn backwards. To performe this motion it hath two muscles. The first is *gemellus externus*, or *gastrocnemius externus*: this muscle hath two heads, that have seedbones not far from their beginnings. The first head is under the ham, from the inner part of the end of the thighbone, where it is fleshy and broad. It marching down by the back and inner part of the *tibia*, when it is

Extenders.

I

come

come to the middle of it, it becometh tendinous, and is joyned with the tendon of *gemellus internus*. The other head likewise ariseth under the ham, but from the outer part of the end of the thigh-bone. It passing downe by the outward and back part of the Leg, becommeth tendinous a little above the tendon of the former; then being joyned to the former, they become one strong, broad, and sinewy tendon, which is inserted into the heele. The second is *gemellus internus*, or *gastrocnemius internus*: this lyeth under the former, and is of a livid colour. It springeth from the *appendix* of the lesser foci by a strong nervous substance: it doth become thicker, but when it hath passed the middle of the *tibia* it becommeth narrower, and tendinous; and a little above the heele it is so united to the tendon of the former *gemellus*, that both seeme to be but one, and is inserted into the heele. By this tendon Butchers hang up the

Q 3

beasts

Movers  
obliquely.

1.

beasts killed. The Instep is moved obliquely by two. The first is *peroneus posterior adducens pedem* or *Nauticus*, because Sailers use it much when they goe up by the ropes. It springeth both from the greater and lesser focill, and from the ligament which tyeth these together ; it being tyed to this tendon, lyeth amongst the hinder muscles, and neere to the inner ankle it becommeth tendinous: then passing by it, it goeth to the sole of the foot, and is inserted into the lower part of the bone which is next to the *cubiforme*. The second is *peroneus vel fibulam posterior* : this ariseth from the upper, but hinder part of the small focill, by a nervous and strong beginning ; and cleaving to the outside of the perone, it passeth down round and fleshy : the outer part is of a livid colour, but the inner of a red. When it is come to the middle of the focill it becometh tendinous, which behind under the outward ankle, obliquely marching

2

marching, is inserted under the soale of the foot into the bone set before the great toe. To these may be added the muscle which is called *plantaris*, because it covereth the whole soale of the foot. It lyeth under the *gemellus externus*, and springing from the outer part of the end of the thigh bone, under the ham, by a round fleshy beginning; then passing within the leg, between the two *gemelli*, and from thence to the soale of the foot, it covereth all the toes about the first joynt, and is inserted into all the toes. It answers *palmaris*.

*Plantaris  
musculus.*

### C A P. XXXI.

#### *Of the Muscles of the Toes.*

**T**HE toes are extended by two. The first is *longus*; it doth arise by a nervous and sharpe beginning from the fore *appendix* of the great focill, and cleaving to the ligament which uniteth the two focils, it goeth down to the

Extenders.  
I



2

Benders.

I

foot. First, it passeth under the transverse ligament; then it being divided into four tendons, they are inserted into the third and second joynt of the four toes to extend them. The second is *brevis*; this lieth under the former: this hath its beginning from the transverse ligament, fleshy and broad, and by its four tendons it is inserted into the first joynts of the four toes. The benders of the toes are in like manner two. The first is *longus*, or *perforans*: it lieth under the *gemellus internus*, and ariseth from the hinder part of the *tibia*, under the ham by a long and a fleshy beginning; and passing according to the length of the *tibia* unto the which it cleaverth, when it hath the middle of it, it becometh tendinous: then under the inner ankle, and the ligament which reacheth from the lower *appendix* of the *tibia*, it goeth by a hollownesse of the heele to the soale of the foot; where being divided into four tendons, it passeth through

through the holes of the *flexor Brevis*, and is inserted into the third and last joint of the four fingers. The second is *brevis*, or *perforatus* : this springeth from the inner part of the heele-bone, and when it hath passed the middle of the foot, it is parted into four round tendons which are inserted into the second joints of the four toes, being perforate to give way to the tendons of the former muscle to passe to the third joynt. Thirdly, *lumbricales*, four: these spring from the tendons of the *perforans*, small and round, and are inserted by a small tendon into the side of the first joynt, which they helpe to bend. The fleshy substance, which filleth up the cavity of the first joynts of the four fingers, seemeth much to further the action of these muscles : for springing by two sharpe beginnings from the lower part of the heelebone, it is inserted into the beginnings of the four *lumbricales*.

*Lumbricales. 4.*

The *interossei* are placed betweene the bones of the instep. These *interossei*, so called, because they are placed betweene the bones, in the foot, are ten in number; whereas there are but eigh in the hand, because the instep hath one bone more then the wrist. Each of them doth spring from the side of the bone of the instep where it is placed; and all marching according to the length of the bone fleshy, they are inserted into the roots of the fingers by short tendons, and somewhat broad. If the inner be drawne together, the finger is brought in; but if the outer be moved, the finger is carried from the rest. Betweene the foure distances between the bones, there are eight such muscles; at the outside of the thumb one, and one other at the outside of the little finger. Besides these you may observe a small tranverse muscle, which passeth from the thumbe over the first joynts of the fingers to the little finger. It seemeth to have

The transverse muscle.  
The invention of this is ascribed to *Casseri* by *Barolinus* l. 4. c. 14.

have a twofold use: first, to tye together the bones of the first joynts of the toes. Secondly, to save their tendons from harm when we tread upon hard things.

The great toe hath peculiar muscles. The first is *extensor*: this springeth by a fleshy beginning from the outside of the great foscilla, where it parteth from the *fibula*. It cleaveth fast to the ligament, which ties the *tibia* to the *fibula*, and marching alongst the upper part of the foot, it is inserted into the whole upper part of the thumb. The second is *flexor*: this springeth from the backe part of the *fibula*, about the middle of it fleshy and pointed: then becoming thicker, about the inner ankle it becommeth tendinous and is inserted into the last joynt of the thumb: before it come to the second joynt it hath a larger seed-like bone then the joynts of the rest of the fingers have. The third is *adducens pollicem*, which draweth the great toe from the rest, to the inner part

Extenders  
of the great  
toe.

I

2

3

4

of the foot. It springeth nervous from the ligament which tyeth together the heele-bone, and the *talus*, it cleaveth to the bone set before the thumb, and is inserted by a round tendon into the outside of the first joynt of the great toe. The last is *abductor minimi digiti*: this being placed in the outside of the foot it proceedeth from the outer part of the heele-bone, where the knob is nervous; but becoming fleshy, and being tyed to the bone of the *metatarsus*, which stayeth the little toe, it is inserted by a round tendon into the outside of the first joynt of the little toe;

---

The



# The number of the Muscles of each part.

|                             |   |
|-----------------------------|---|
| <b>T</b> He eye-lid hath    | 4 |
| The occipitals on each side | 1 |
| Each eye hath               | 6 |
| The nose hath               | 6 |

These are in number 17.

|                             |    |
|-----------------------------|----|
| Both the lips have          | 10 |
| The lower jaw hath          | 10 |
| The eare hath               | 10 |
| The tongue hath             | 8  |
| The bone of the tongue hath | 8  |
| The <i>larynx</i> hath      | 10 |
| The <i>uvula</i> hath       | 2  |
| The <i>pharynx</i> hath     | 7  |

These are in number 65

|                 |    |
|-----------------|----|
| The head hath   | 14 |
| The neck hath   | 8  |
| The breast hath | 30 |
| The             |    |

|                          |    |
|--------------------------|----|
| The loins have           | 6  |
| The <i>abdomen</i> hath  | 10 |
| The prick hath           | 4  |
| The <i>clitoris</i> hath | 4  |
| The stones have          | 1  |
| The bladder hath         | 1  |
| The <i>anus</i> hath     | 3  |

These are in number 81

|                           |    |
|---------------------------|----|
| The sholder-blade hath    | 5  |
| The shoulder hath         | 8  |
| The <i>ulna</i> hath      | 6  |
| The <i>radius</i> hath    | 4  |
| The wrist hath            | 4  |
| The palm of the hand hath | 2  |
| The four fingers have     | 19 |
| The thumbe hath           | 5  |

These are in number 53

|                 |    |
|-----------------|----|
| The thigh hath  | 11 |
| The shank hath  | 13 |
| The instep hath | 7  |
| The toes have   | 23 |

These are in number 54

|  |     |
|--|-----|
| The totall summe of all the muscles of the body of man | 270 |
|--|-----|



AN  
ENUMERATION  
OF ALL THE  
MUSCLES  
OF THE WHOLE  
BODIE.

**E**Ach eye hath one frontall to lift it up : the first is called *orbicularis major*, under the frontall ; and two called *ciliares*, one in each eyelid to shut it.

The occipitals which meet these, are two, one on each side.

As for the *eare*, in the outside there are foure paire : first, *par attollens*, lifting it up : secondly, *par deprimens*, pulling it down : thirdly, *par adducens*, which moveth it forward : fourthly, *par abducens*, which pulleth it backward. In the inside there are two, *externus*, the  
exter-

The muscles of the eye-lids four in each.

The muscles of the eares. 10.



The muscles of the eye, 6.

externall ; and *internus*, the internall.

The eye hath six muscles, foure straight, and two oblique.

The first of the straight is called *attollens*, or *superbus*.

The second is *deprimens*, or *humilis*.

The third *Adducens*, or *bibitorius*.

The fourth *Abducens*, or *indignatorius*.

The oblique are two :

1. *Obliquus major, seu superior*.

2. *Obliquus minor, seu inferior*.

The nose hath six muscles.

*Erectores*, or pullers upwards two.

*Dilatatores*, or openers, two.

*Constrictores*, or pullers together two, one in each side.

The lips have two common muscles, and four proper :

Of the common, the first is called *zygomaticus*, the second *bucco*.

Each lip hath four proper :

1. *Attollens*, which beareth up the upper lip.

2 *Depci-*

The muscles of the nose. 6.

The muscles of the lips, 10.

2. *Deprimens*, which beareth the lower lip downwards.

3. *Orbicularis*, or *sphincter*, which maketh up the fungous substance of the lips.

4. *Abducens*, or drawing aside.

The lower jaw is moved upwards by three muscles : the *temporalis*, the *pterygoideus internus*, and the *masseter*.

The muscles of the lower jaw, 10.

It is pulled down by *digastricus*, and *musculus latus*.

It is pulled forward by *pterygoideus externus*.

The tongue hath eight muscles, four on each side.

The muscles of the tongue, 8.

1. *Genioglossus*, which draweth it forwards.

2. *Alloglossus*, it helpeth the thrusting of it out.

3. *Basiglossus*, or *hypsiglossus*, by the which it is pulled backwards.

4. *Styloglossus*, or *ceratoglossus*, by the which it is moved to the sides.

The *os hyoides* hath four muscles on each side.

The muscles of the bone of the tongue  
4.

The muscles of the larynx.

9

1. *Sternohyoideus*:
2. *Geniohyoideus*.
3. *Coracoideus*.
4. *Stylohyoideus*.

The *larynx* hath four common muscles, and five proper.

Of the common there are,

1. Two *thyrohyoidei*, which pull up the *larynx*.
2. Two *Bronchii*, which pull it down.

Of the proper,

1. *Cricothyroideus anticus*.
2. *Cricothyroides lateralis*.
3. *Cricoarytenoides posticus*.
4. *Thyroarytenoides, five glottens*.
5. *Arytenoides*.

The muscles of the pharynx.

9

The *pharynx*, or beginning of the *œsophagus* hath seven muscles, three paires, and one without a match.

Of the paires.

1. *Sphenopharyngeus*.
2. *Cephalopharyngeus*.
3. *Staphylopharyngeus*.

That which hath no match is called *œsophageus*.

The

The *gargareon* hath two Muscles.

1. *Pteryſtaphilinus externus*, this holdeth it up.

2. *Pteryſtaphilinus internus*, this doth the ſame.

The *head* hath two ſorts of muſcles: for ſome are common, and ſome are proper : the common, which together with the neck move the head ; and theſe are the muſcles of the neck.

The proper are thoſe which onely move the head, when the neck remaineth immoveable : and theſe are in number fourteene. It is pulled forward by the two *maſtoidæi* : theſe are placed before ; theſe bend it forward. Behinde twelve are placed.

1. *Splenius, vel triangularis.*

2. *Complexus, vel trigeminus.*

3. *Recti majores*, two.

4. *Recti minores*, two ; theſe ſtretch out the head.

5. *Obliqui majores, ſive ſuperiores*, two.

6. *Obliqui minores, ſive inferiores,*

The muſcles of the uvula. 2.

The muſcles of the head. 4.

Proper muſcles.  
14.

The muscles of the neck, 8.

*feriores*, two : these winde the head about.

The neck hath foure on each side.

It is bended by two paires,

1. *Par longum*.

2. *Par spinatam*, *triangulare*, *scalenum*.

It is extended by two paires.

1. *Semispinatum*.

2. *Transversarium*.

Seeing 64. muscles serve for one side of the head and neck, there must be 128. for both the sides.

The trunke of the body hath 46 muscles for one side.

The muscles of the breast.

As for the breast, first, these dilate it :

1. *Subclavius*.

2. *Serratus major*.

3. *Serratus posticus superior*.

4. *Serratus posticus inferior*.

5. *Intercostales externi*, fifteene in number, which are as one muscle.

The breast is contracted by fifteen in number.

1. *Sacrolumbus*.

2. *Semispinatus*, or *triangularis*

3. The internall intercostals, in number thirteene.

*Diaphragma*.

Double this number, and you shall have 32.

The loynes are bended by the *triangulares*, one on each side.

They are extended by foure, two on each side.

1. *Semispinatus*.

2. *Sacer*: two of them on each side.

The *abdomen* hath five on each side.

1. *Obliquus ascendens*.

2. *Obliquus descendens*.

3. *Rectus*.

4. *Transversalis*.

5. *Pyramidalis*.

The stones have two cremasters to elevate them.

The prick hath two, on each side.

1. *Erector*, or *Collatera-*

*li*

2. *Ac-*

The muscles of the loines,

The muscles of the belly, 10.

The muscles of the stones, 2.  
The muscles of the prick, 4.

The muscle of the bladder 1.  
The muscles of the *anns*, 3.

The muscles of the *Arme*.  
The muscles of the shoulder-blade, five on each side.

The muscles of the shoulder.  
8.

2. *Accelerator*, or *interior*.

The *bladder* hath one, the *sphincter*.

The *anns* hath three muscles: one to purse it in, called *sphincter*; and two to pull it up, called *levatores*.

Double this number, and you shall have 92.

The *Arme* hath 44. muscles.

The shoulder blade hath five muscles on each side.

1. *Trapezius*, for sundry motions.

2. The proper *levator*, or lifter up.

3 *Rhomboides* which draweth it backwards.

4. *Serratus minor anticus*, drawing it forewards.

5. *Serratus Major*.

The *brachium* or shoulder hath eight.

1. *Deltoides*.  
2. *Supraspinatus*. } moving it up-ward.

3. *Latissimus*.  
4 *Rotundus major*. } drawing it downward

5. *Pi-*

5. *Pectoralis*. } pulling it for-  
6. *Coracoideus*. } ward.

7. *Rotundus minor*  
8. *Immersus*, or  
*infraspinatus*. } pulling it  
backward.

The elbow hath ten muscles.

The ulna hath six.

The muscles of the  
ulna, 6.

1. *Biceps*.  
2. *Brachii internus*. } bend it.

3. *Longus*.  
4. *Brevis*.  
5. *Brachii externus*. } extend  
6. *Anconeus*. } it.

The radius hath four.

1. *Pronator rotundus superior*.  
2. *Pronator inferior quadratus*.  
3. *Supinator longus*.  
4. *Supinator brevis*.

The muscles of the  
radius, 4.

The carpus, or wrist, hath four  
muscles.

1. *Cubitus internus*. } these  
2. *Brachii internus*. } bend it:

3. *Rad*

The muscles of the  
wrist, 4.



The muscles of the fingers, 18 in each hand.

3. *Radius externus, five* } these  
*bicornis.* } extend  
 4. *Cubitus externus.* } it.

The fingers have eighteen muscles.

1. *Sublimis.* } by these they are  
 2. *Profundus* } bended.

3. *Communis extensor magnus.*  
 4. Proper to the fore-finger or *indicator.* } these ex-  
 5. Proper to the little-finger, or *auricularis.* } tend the  
 } fingers.

6. *Interossei.*  
 7. *Lumbricales, 4.* } these partly  
 } part them,  
 } partly draw  
 } them together.

8. *Abductor digiti parvi.*  
 9. *Abductor indicis, five indicator.*

The thumb hath six muscles.

1. *Lon.*

The muscles of the thumb, 6.

1. *Longus.*  
2. *Brevis.* } these extend it.

3. One it hath to bend it.

4. *Thenar* bendeth it forward.

5. *Antitbenar* bendeth it backward.

Double the number of 42. the number of the muscles of one arm, and you shall finde 84. muscles of them both.

The thigh hath ten-muscle s.

1. *Psoas.*  
2. *Iliacus.*  
3. *Pectineus.* } these bend it forward.

The muscles of the thigh, 10.

4. *Glutius maximus*  
5. *Glutius medius.*  
6. *Glutius minimus.* } these bend it backwards.

7. *Quadriceps*, or } these bend  
*quadrigemini*, 4 } the thigh  
small muscles. } outward.

8. *Triceps*, this bendeth it inwards

R

9. *Ob.*

9 *Obturator internus*, this rowleth it outwards.

10. *Obturator externus*, this rowleth it inwards.

Double the number 10. and you shall have 20. muscles for both thighs.

The leg hath 42 muscles.

The *tibia* hath 11.

The muscles of the leg. Of the *tibia* 11.

- |  |                  |
|--|------------------|
| 1. <i>Seminervosus</i> .                               | } these bend it. |
| 2. <i>Semimembranosus</i>                              |                  |
| 3. <i>Gracilis internus</i> ,<br><i>seu posticus</i> . |                  |
| 4. <i>Biceps</i> .                                     |                  |

- |  |                    |
|--|--------------------|
| 5. <i>Membranosus</i> , <i>seu fascia lata</i> . | } these extend it. |
| 6. <i>Sutorius</i> , <i>seu longus</i> .         |                    |
| 7. <i>Vastus externus</i> .                      |                    |
| 8. <i>Vastus internus</i> .                      |                    |
| 9. <i>Rectus gracilis</i> .                      |                    |
| 10. <i>Crureus</i> .                             |                    |

The muscles of the feet, 9. 

11. *Suppopliteus*, or *popliteus*, this moveth it obliquely.

The instep hath eight muscles.

1. *Tibialis*.

1. *Tibialis anterior.* } these bend  
2. *Peronæus anterior.* } it.

3. *Gemelli duo*, or the }  
twins. } these ex-  
4. *Plantaris.* } tend it.  
5. *Soleus.* }

6. *Tibialis posticus.* } these move  
7. *Peronæus posticus.* } it oblique-  
8. *Plantaris.* } ly.

The toes have eighteen muscles.

1. *Longus.* } these bend them.  
2. *Brevis.* }

3. *Sublimis.* } these extend them.  
4. *Profundus.* }

5. *Interossei* eight, these bring them together and fever them.

6. *Lumbricales* foure. }  
7. *Caro musculosa*, or } these  
the musculous flesh. } draw  
8. *Transversalis.* } them to-  
9. The drawer in of } gether.  
the little toe. }

The great toe hath foure muscles.

The mus-  
cles of the  
toes, 23.

The mus-  
cles of the  
great toe,  
4.

1. *Extensor*, or extender.
2. *Flexor*, the bender.
3. *Adducens*, that which draweth to the rest.
4. *Abductor minimi digiti*, that which draws the little finger from the rest.

Double the number of 42 expressing the number of the muscles serving for one Leg, and you shall have the number of 84. which is the number of the muscles of both the Legs.



# The Explication of some Appellations of the Muscles, and some other parts of the B O D I E.

**A** Neyroides, *anchorlike.*  
Ancon, *the bending of the elbow.*

Acromium, *the upper part of the shoulder blade.*

Arytenoidæus, *because it beginneth and endeth in the ewarlike cartilage.*

Bronchus, *the lower part of the windpipe.*

Biceps, *because it hath two heads.*

Ceratoglossus, *because it ariseth from the points of the bone of the tongue, & is inserted into the tongue.*

Coracohyoidæus, *because it springeth from the proesse of the shoulderblade like the crows bill,*

and is inserted into the bone of the tongue.

Cephalopharingæus, because it beginneth where the head is joyned to the neck by the first vertebra, and is inserted into the pharinx.

Cryothyroidæus, because it springeth from the ring-like cartilage, and is inserted into the thyroids.

Cryoarytenoidæus, because it beginneth at the ring-like, and endeth at the ewe-like cartilage.

Corone is the proccesse of the lower jaw.

Coracoides, like the crows bill.

Cremaster, it holds up the stone.

Deltoides, because it is like to the Greeke letter  $\Delta$ .

Geneoglossus, because it hath its beginning from the chin, and is inserted into the bone of the tongue.

Gluteus, because it maketh up the buttocks.

Gastrocnemius, because it maketh up the calf of the leg

Hypsiloglossus, because it hath its beginning from the bone of the tongue,

tongue. & is inserted into the tongue.

Hyothyroidæus, because it springeth from the bone of the tongue, and is inserted into the buckler like cartilage.

Larynx is the beginning of the wind-pipe, derived from λαρυγγίζεν, which is to shout with an open mouth. It is framed of foure cartilages: the first is Thyroides, buckler-like: the second and third is Arytenoides; ear-like: the fourth is Cricoides, ring-like.

Myloglossus, because it bath its beginning at the root of the grinders of the lower jaw, and is inserted into the tongue.

Mastoidæus, because it is inserted into the dug-like prociſſe of the temple.

Masseter, because it serves for eating.

Pharynx is the throat. Psoa, because it is clipped in embracing.

Rhomboides, because it is like the mathematicall figure called rhombus, having foure lines, but not the foure sides equall.



*Sternohyoidæus*, because it bath its beginning from the Sternum, and is inserted into the bone of the tongue:

*Styloceratohyoidæus*, because it springeth from the bodkin-like pro-gresse, and is inserted into the points of the bone of the tongue.

*Sphænopharingæus*, because it springeth from the wedge-bone, and is inserted into the pharynx

*Stylopharingæus*, because it beginneth at the bodkin-like pro-cesse and is inserted into the pharynx.

*Styloides*, because it representeth the pin of a Table-booke, or a needle.

*Sternohyoidæus*, because it beginneth at the Sternum, and is inserted into the bone of the tongue.

*Spinatus*, which is placed by the sharp brim of a bone.

*Sigmoides*, which is like to the Greeke Z.

*Sphænoides*, the wedge like bone.

*Sphincter*, the drawer together.

*Thyroa-*

Thyroaritenoidæus, because it  
beginneth at the bucklerlike carti-  
lage, and endeth in the earlike.

Trigeminus, which hath three  
beginnings.

Trapezius, because it hath foure  
sides bounded with unequall lines: for  
the Geometers so call such a figure.

R ;

The



The explication of the fourth  
Figure.

1. *The bones of the head.* 2. *The bones of the chain of the back.* 3. *The shoulder-blade.* 4. *The ribs.* 5. *The os sacrum.* 6. *The thigh-bone.* 7. *The bones of the knee.* 8. *The bones of the legs.* 9. *The bones of the feet.*



The explication of the fifth  
Figure.

1. The shoulder-bone. 2. The elbow-  
bones. 3. The bones of the hand.  
4. The bones of the backe. 5. The  
ribe-bone.

These two figures are to be placed  
in their order immediately be-  
fore the first Chapter of the  
book of bones.



The fourth  
**BOOKE**  
 Of the BONES.

C A P. I.

*Of the nature of a Bone.*

**T**O the perfecting of a bone four causes concur. First, the efficient cause; which is the ossifick faculty of the spirit, unto which the naturall heat ministreth. Secondly, the materiall cause; which is twofold: The one is of the generation, the other of the nutrition of the bone. The matter of generation is the thickest

thickest part of the seed: The matter of nutrition is blood, with the which all parts of the body are nourished; and not the marrow. For first, small bones have no marrow. Secondly, the marrow is hot and moist, but the bones cold and dry. The veins and arteries which carry this nutrimentall blood, are placed in the ends of the bones, as in the scull, thigh-bone, and the great focill of the legge. The marrow serveth for the moistening of the bones, which are dry and still in motion. No nerves passe to the bones; for they onely feel by the benefit of the *periostium*. Thirdly, the formall cause is twofold: by the essentiall it is cold and dry; the accidentall is the figure, which for the most part is either round or flat. Fourthly, the finall cause is double: the generall, which serveth the whole body; and it is threefold: First, they establish the soft parts: Secondly, they give figure to the parts: Thirdly, they further the motion of the body.

*Lib. de assib.  
ad Tyton.*

The

The speciall is that which is proper to every particular bone. Of the premises such a description of a bone may be gathered : *A bone is a similiary part, most dry and cold, inflexible, compacted of the thickest part of the seed by the spirit, the naturall heat concurring, to afford stableness and figure to the whole body.*

## C A P. I I.

### *Of the naturall affections of Bones.*

**T**Hese affections are either common to all bones, or proper to some only.

The common are nine : For first, a bone must be hard, the better to stay the body : Secondly, without it must be slippery, for ready motion : Thirdly, it must be white, because it is a spermatick part and nourished by blood. Fourthly, it must be destitute of feeling, for avoiding of pain in motion.

motion. Fifthly, it must be either hollow or spongiouse, to contain a marrowy substance, for moistning of them. Sixthly, it must be tipped in the ends with a cartilage, and be bedewed with an unctuous humour, to procure an easie motion. Seventhly, that it be covered with a membrane, to preserve it from cariosity, except the three bones of the eare, and the parts of the teeth above the gummies. Eighthly, that about the ends it have holes, to admit veins and arteries for nourishment. Ninthly, that it be equall. Wherefore the *callus* wherewith a broken bone is united, and nodes in the pox, are not naturall affections. By these you may pronounce a bone to be ill affected: First, if it be soft; because it must cause the member to be too flexible. Secondly, if it be dry; for then it is distempered. Thirdly, if it be white; for then it is dead. Fourthly, if it be black; for then it is carious. Fifthly, if its figure be altered;



tered ; for then it must hinder the action of the part.

The proper affections are four : The first is a cavity ; and it is twofold : for it is either deep , and it is called *cotyle* ; or shallow , and it is called *glene*. The second is a bunching out ; and it is either harder than the rest of the bone, and it is called *apophisis* ; or it is softer and it is called *epiphisis*. If the bunching out be round, it is called *caput* ; under it is the *cervix*, as in the upper end of the thigh-bone, If it be flat, it is called *condilus* : if pointed, *corone*. Other protuberancies are named from the similitude they have from other things ; as *stylويدis*, bodkin-like ; *coracoides*, crow-like, &c. The third is inequality : this is seen in the nowl for the insertion of muscles. The fourth is smoothnesse, as the rest of the skull.

## CAP. III.

*Of the differences of the joyning of bones together*

**T**hey are coupled together either by joynting or growing together. Jointing is either for manifest or obscure motion. The jointings which serve for manifest motion are three. First, *Enarthrosis*, and it is when a large head of a bone is received in a deep cavity, as the thigh-bone in the hip bone. Secondly, *Artbrodia*; it is when the cavity which receiveth is shallow, and the head of the bone which is received shallow: such is the articulation of the lower jaw with the tempil-bone. The third is *Ginglymos*; when the same bone receiveth, and is received. This falleth out three manner of wayes; first, when the bone is received by another, and receiveth the same; this is seen in the articulation of the shoulder-bone with the elbow.

bow-bone. Secondly, when a bone receiveth one bone, and is received by another: this may be seen in the spondils of the back, where the middle bone receiveth the upper, and is received by the lower. The third is, when the proceſſe of the bone being long and round, is inserted into another upper bone, and so is turned in the cavity as if it were in an axle-tree; so is the second *vertebra* of the neck with the first.

Articulation for obscure motion may be observed in the articulation of the ribs with the spondils, and in the bones of the wrist and ankle.

Bones grow together either without some middle substance, or with it: Without some middle substance they are coupled three manner of wayes. First, by a line, as the bones of the upper jaw and nose are coupled: this is called *harmonia*. Secondly, by a future, as the bones of the skull are united. Thirdly, when one bone is fastened

ned in another, as a nail in wood ; and so are the teeth fastened in the gums : this is called *gomphosis*. If bones grow together by a middle substance , it is either by a cartilage ; and so are the share-bones joyned : this union is called *synchondrosis* : or by a ligament , and so the thigh is joyned with the hip-bone : this is called *synneurosis*. Or last of all , by flesh , and so is the bone of the tongue to the shoulder : this is termed *syssarcosis*.

The uses of the coupling of bones are these. First, for motion. Secondly, for perspiration , as in the sutures of the head. Thirdly, to give way to the passing of some substance, as the same sutures to give way to the *dura mater* to make the *pericranium*. Fourthly, for securities sake , as one may see in a member where many bones are. Fifthly, to put a difference between parts , as we perceive in the bones of the upper jaw.

## CAP. IV.

*Of the sutures of the head.*

**T**He bones of the whole body belong to these foure parts of it; the head, neck, the brest, the lower belly: and the lims. The head is that part which is above the *vertebræ* of the neck: of it there are two parts, the skull, and the jawbones. The skull is that bony substance which containeth the brain, and is decked with haire. In the description of the bones of the head these two things are to be noted; the sutures, and the number of the bones. The sutures are either proper, or common: the proper are those which joyn the bones of the skul one with another; and they are either true sutures, or counterfeit. The true are those which represent two combs joyned together by their teeth, these are three in number: the first is *coronalis*: It is seated in the forepart, and

and passeth from one tempil to the other transversly. The second is *lambdoides*, opposite to this, resembling the Greek letter  $\Lambda$ . The third is *Sagittalis*: this uniteth both, and beginning at the top of the *lambdoides*, reacheth sometimes to the nose.

The counterfeit, or *mendose* resemble a line onely. The remarkable of these are the *squamosæ*, or skale like sutures: these unite the bones of the tempils with those of the *vertex*, or top. They are two, one above each eare: they begin from the backside, in the lower part of *processus mammillares*, and passe through the whole side of the skull. The common sutures are those which belong to the skull, the wedgelike bone, and the upper jaw. The most remarkable are these: first, *frontalis*, by the which the outer proceſſe of the *os frontis* is joyned with the first bone of the upper jaw. The second is *cuneiformis*, by the which the wedgelike bone, it being in the middle of it, is joyned with the first bone of the  
upper

upper jaw. The third is *cribrosa*: this is common to the wedge-like bone, and the *septum*, or partition of the nose. The sutures have three uses: the first is to stay the braine from tottering by staying of it, by sending some fibres from the *dura mater* through the sutures. The second, to breath out the vapour sent unto the braine from the lower parts. The third to stay fractures from going further.

## C A P. V.

### *Of the proper bones of the head.*

**T**Hese are in number six, one of the forehead, another of the noddle, two of the crown, and two of the temples. First, *os frontis*, the forehead-bone: It is bounded by the coronall and first common suture, before, and in the sides by the temporall bones. It is but one in those of ripe age, but double in children, being divided by

by a suture passing from the coronall to the nose. On each side of this bone in the upper part of the eye-browes, there is a large cavity and often two, from whence two holes passe to the hollownesse of the nose.

These cavities containe a clammy substance, kept in by a greene membrane. This receiveth the aire containing in it some odour received by the nose to stay it a while before it be sent to the braine. It hath two holes in the middle part of the eye-brow, which goe to the orbit of the eye; by the which, the first branch of the nerve of the third conjugation of the braine to the muscle of the forehead. It hath also foure processes; the greater two are seated about the greater corner of the eye, but the lesser two about the lesser corner.

The bones of the crowne are in number two: Before they are joyned with the bone of the forehead, by the coronall suture, with the noddle bone by the suture  
*lambdoides:*



*lambdoides*, to the tempil-bones, by the *sutura squamosa*, without they are smooth, but within unequal, by reason of the prints which the jugular veins of the *dura mater* leave.

Under these are the bones of the tempils. They are joyned with the bones of the crowne by the *sutura squamosa* in the sides ; before with the first bone of the upper jaw by its first prolesse, to the nowle-bone, by the counterfeit suture. These bones are thin in the upper part like a skale ; but below thick, hard, and unequall, or rough, wherefore they are called *Petrosa*, rocky. In these are *meatus auditorii*, by the which the sounds passe to the braine. Of the furniture of this passage, peruse *lib. 3. cap. 23.* of the inward parts of the eare. These bones have sundry holes for the letting of vessels to the braine.

The nowle-bone called *os occipitale* is joyned to the crowne-bones, by the suture *lambdoides*.  
It

It is the thickest of all the bones of the head. It is smooth without; but hath sundry sinuosities to receive the meninges safely: through the great hole of this bone the *spinalis medulla* passeth to the back-bone.

These bones of the skull have two tables: The uppermost is hardest, thickest, and smoothest. The lower is unequal, and pitted to give way to the vessels dispersed through the *dura mater*. Between these two tables there is a certaine spongiouse substance, marrowy, and red, for the nutrition, and humectation of the bones. It is red, by reason of the small veins passing that way: this substance hath a threefold use: first, it receiveth blood for the nutrition of the skull. Secondly, in fractures of the skull, it causeth the *porus sarcodes* the sooner to grow. Thirdly, it furthereth the discharging of vapours from the braine.

## CAP. VI.

*Of the bones common to the skull  
and upper jaw.*

**H**itherto of the bones proper to the skull : Now follow those which are common to it and the upper jaw : these are three : First, the wedge-like bone, or *cuneiforms* ; so called, not that it is like a wedge, but that it is seated in the middle of the bones of the skull and the upper jaw. Before it is joyned with the forehead bone, by a bastard, as also to the nose-bone. At the sides it doth accompany a good way the *os petrosum*, from whence it is separate by a rough chink. Above, it doth touch the first, fourth, and sixth bone of the upper jaw ; below, it toucheth the bones of the palate of the mouth by the wing-like processes. It is thick and solid where it maketh the basis of the skull ; it is the thickest of all the bones of the head.

head. Where there is a cavity, like to those above the eyebrowes, of the processes of it, within the skull, *Sella Turcica*, the Turkish Saddle is framed. In the middle of it the *glandula pituitaria*, which receiveth the pituitous excrements falling from the braine. Without the skull you shall finde one on each side, about the sides of the holes of the nose like unto the wings of a Bat; and from thence called *processus aliformes*. It hath sundry perforations, by the which the motorie and opticke nerves of the eye, and other nerves for the motion of other parts, as vessels, also veines and arteries for nourishment passe. The second common bone is *ascribriforme*, because like a sieve, it hath many holes: by these, smells passe to the braine. A proceſſe like to the combe of a Cocke, and therefore called *crista galli*, divideth the upper part. Another thin bone passeth above to the instruments of smelling and below to the nostrils, dividing the nose in two

parts, the right and the left called *septum nasi*. This bone giveth way to the discharging of the excrements of the braine.

The third common bone is *os jugale*, or the yokebone. It is placed on every side of the face between the cavity of the hearing and the first bone of the upper jaw. It is framed of two bones: the hinder is a prolesse of the templebone about the passage for hearing: the forebone is a prolesse of the first bone of the upper jaw, which maketh the lesser corner of the eye. These two bones are joyned by an oblique suture, and make the yokebone; because like a yoke it stayeth the sides of the upper jaw. It strengthneth the tendon of the temporall muscle which passeth to the lower jaw, and the muscle *masseter*.

## CAP. VII.

*Of the jawes.*

**N**ow follow the bones of the face ; they are the jaw bones, the teeth, and bone of the tongue. The jawes are two, the upper and lower. The substance of the upper jaw is not solid, but spongiouse, as the pumix stone ; and unequall, because it is framed of sundry bones ; they are fixe paire, fixe in each side. The first is *zygomatium* : It maketh up the best part of the yoake-bone, the outer corner of the eye, and a great part of the orbit of the eye. *Zygoma*, or the yoake-bone, is nothing else but a bonie halfe circle made of two proceesses : whereof the one proceedeth from the *os petrosum* ; but the other is a portion of the cheek-bone. The second is *os lachrymale*, it is a round, little, and thin bone in the inner corner of the eye, wheron the *caruncula lachrymalis* resteth.

reflecth in the lower part of it there  
 is a hole which passeth to the cavi-  
 ty of the nose : by this the third  
 branch of the third pair of sinewes  
 of the braine passeth to the inner  
 membrane of the nose. The third  
 is thin as the former ; but quadran-  
 gular. It is joyned with the bone of  
 the forehead , and the wedge-like  
 bone. The fourth is *os male*, the  
 cheek-bone, the greatest and  
 thickest. This containeth all the  
 upper teeth, and maketh up the  
 holes of the nose, and most of  
 those bones which belong to the  
 upper part of the face. It is joyned  
 above with the bone of the fore-  
 head, but below with the wedge-  
 like bone ; before with the *os la-  
 chrymale*, behinde with the third,  
 and last of all with its fellow. The  
 fifth is long, hard, reasonable  
 thicke ; it maketh up the bony part  
 of the nose. It is joyned with the  
 cartilages of the nose below ; but to  
 the internal proceſſe of the *os fron-  
 tis* above. The sixth doth make up  
 the rooſe of the mouth with its  
 fellow.

fellow. Six bones then make up the orbit of the eye. The first is *Frontale*, which maketh the upper vaulted part. The second is placed in the outside where the lesser corner is, and is a portion of the wedge-like bone. The third maketh up the outside concurring with the former portion of the wedge-like bone. The fourth and fifth make up the inside. The sixth maketh up the lower part. These within the orbit are discerned partly by common, partly by proper sutures.

The lower jaw in those of ripe age is but one bone; but in beasts it is compacted of two bones. It resembleth the Greek letter *υ*, or a bow: that portion which pointeth out in the arched part is called the chin. At both the ends of it there are two processes whereof the one is sharpe, and is called *corona*: and receiveth the tendon of the temporall muscle. The other may be called *articularis*, because it serveth for articulation. Within this jaw there is a long cavity which ariseth



at the roots of these processes. By it is the third branch of the third paire of sinewes of the braine, together with a veine and artery to the teeth. This may be found out by a small copper wire. This only is moveable, and both have sockets for the teeth; they are in number equall with the number of the teeth; they are enlarged by the teeth, and when in old age the teeth fall out, the sockets draw together, and become sharp.

## C A P. VIII.

### *Of the teeth.*

**T**He teeth are placed in the gummes. Their articulation is not uniform; for they are infixed into the gummes as a nail to a post by *gemphosis*. Their root is tyed to the mandible by a nerve, for steadinesse, by *sinneurosis*; and the upper part compassed by the fleshy substance of the gumme, by *syssarcosis*. One

One thing is to be noted, That the Cutters and Dogges-teeth sometimes are implanted into the gummes by a crooked phang: whereby it falleth out, that when such teeth are drawn, the socket must be fractured.

Their substance is hardest of all other bones ; yet they do grow : for if a tooth in either gumme be drawn, the tooth opposite to it will in time fill up the vacuity left after the drawing of the other. Their figure representeth a naile; for in the top they are flat, and in the root sharp. Towards the root they have a cavity compassed every way by a membrane, by the which they have an exquisite sense of feeling : the first qualities, heat and cold, much affect them, by reason of the membrane ; yet second qualities, as hardnesse and softnesse, do not offend them.

The teeth have veins from the jugulars, arteries from the soporals, and nerves from the third conjugation. Seeing these vessels

proceed from the principall parts, the liver, heart, and brain : it is no wonder that children when they breed teeth are troubled with fevers, lasks, and convulsions; the principall parts be effected by consent.

As for the number of them, commonly there are found sixteen in each gumme. If there fall out any difference in individuall persons, it falleth out by reason of the *molars*.

There are three ranks of teeth: Those of the first ranke are called *incisores*, Cutters. Most commonly foure are found in each jaw: they have but one phang, and so easily fall out. These first make way out of the gummes, because the tops of them are sharpest. Those in the second rank are called *canini*, or Dogges-teeth, from their length, hardnesse and sharpnesse above the rest. In each jaw there are two; at each side of the cutters one; they are called eye-teeth, not that they reach to the orbit of the eyes; for they mount no higher then the

nostriles ; but because sprigs of the nerves which move the eyes, are carried to them. Those in the third ranke are called *molars*, grinders ; Because as mills they grinde the meat. Most commonly they are twenty in number, five in each side of every jaw : Of these the foure next to the Dogge-teeth are perfected in the youth ; but the other two come not out untill the twenty eight, or thirty yeares, yea, sometimes the old age it selfe come on. In some they never appeare. They are called the teeth of wisdom. These have more roots than the other. Those of the upper jaw have more fanges than those of the lower jaw ; first, because they hang : secondly, because the substance of the upper jaw is not so firme as that of the lower. The two of the upper jaw next to the *canini*, have two fanges, the rest three. Those next to the Dogsteeth in the lower jaw have but one fang, and the rest but two.

The use of the teeth is to chew

the meat to prepare it for the stomacke to make a laudable *chylus*; wherefore the cutters pull the meat asunder; the Dog-teeth breake it, and the grinders make it small, wherefore they are flat in the top, that they may receive and keepe the meat, and rough, that they may bruise it the better.

The teeth come out in man the seventh month, and sometimes more slowly, but in beasts sooner, because they are to eat solid meat. Of these teeth, ten in each gumme, to wit, the foure cutters, the two Dogges teeth, and foure grinders doe cast. The fore teeth cast the fourth, fifth, and sixth yeares of the age, the hinder slower.

## C A P. IX.

### *Of the Bone of the Tongue.*

**T**His bone is seated under the lower jaw, in the uppermost part of the *Larynx*. It is like to the

the Greek vowell *υ*, or the lower jaw; because it is arched before, and spread like hornes behind. There are three parts of this bone. The first part upholdeth the tongue, which resteth upon the upper part of it, and is called *basis lingue*. The other two are laterall, and are called *cornua*, or hornes. These bones are tied to the adjacent parts, partly by a fleshy, partly by a nervous substance. This bone serveth to keep the throat open, that the meat may descend into the stomach, and the ayre have passage to the wind-pipe while we speake and breathe.

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## C A P. X.

### *Of the bones of the Neck.*

**H**itherto then of the bones of the head, now follow the bones of the neck.

They are of two sorts, to wit, the *clavicule* or cannell bones, and  
the

the *vertebre*. They are called *claviculae*, because they represent the figure of keys used in ancient times. They are like the great Roman S, for they seeme to be framed of two semicircular bones; but placed one opposite to another. The substance of these bones is hollow, but more about the heads, and lesse about the middle. In number they are two, one on each side. Neere the throat they are round; but towards the shoulder flattish. They are tied to two bones, to wit, to the shoulder-blade, and the breast-bone. The use of them is to uphold the shoulder-blades, that they should not fall upon the brest together with the shoulder-bone; which falleth out when there is a fracture in them.

The *vertebrae* of the neck are in number seven. The bones of these are harder than of the other, because they are more moved. These have first a large hollownesse to give way to the *spinalis medulla*:

then two holes in the transverse processes, one in each side, through which veins and arterics passe to the head. These *vertebrae* being uppermost are lesser then the rest. They have processes oblique, transverse, and those behinde. These last are forked, if you except the first and last two. The first *vertebra* hath no sharpe corner, lest the two small muscles of the head, springing from the second *vertebra*, should be hurt when the head is stretched out; upon this the head is moved forwards and backwards. The substance of this is harder, solidier, and thinner than that of the rest, because it is the least, and the cavity of it is biggest. The *sinus* of it which receiveth the tooth-like proceſſe, is garnished with a cartilage round, where the proceſſe is. Here the head is turned round. As for the second, out of the middle of it the tooth-like proceſſe doth spring long and round. It is joyned with the first *vertebra* by a  
broad



broad ligament compassing it. If a luxation happen here, it is deadly. The foure that lie under these, in all things are like the rest: their laterall processes are large, and parted at the sharpe corners, to receive the more muscles. The seventh is the largest of all. It is like to the *vertebræ* of the breast; for it hath neither transverse processes, neither is the hindermost forked.

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## CAP. XI.

### *Of the vertebræ of the breast.*

THE bones of the breast are the *vertebræ*, the ribs, and breast-bone: As for the *vertebræ*, they are twelve in number, unto which so many ribs answer; whereof seldome doth one abound, more seldome lack. Their bodies are round in the fore-part; but behinde somewhat hollow. As for processes, they have foure oblique, serving

serving for strong articulation; two laterall, and one sharpe behinde, not divided. They have two hollownesse, on each side one, lined with a cartilage to receive the tops of the ribs. As for holes, they have one large in the middle, which containeth the marrowy substance, and two lesser, besides on each side one.

One thing is to be noted, that the twelfth *vertebra* is not joyned as the rest by *gynglymos*, but by *arthrodia*. Wherefore extending, bending, and turning are performed by this *vertebra*.

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## CAP. XII.

### *Of the Ribs.*

**T**He ribs are twelve in number. Their substance is partly bony, partly cartilaginous; the first serving for firmnesse; the second for articulation. The bony substance towards the *vertebra* is thick

thick and roundish, but towards the *sternum* flat and thin. The cartilages in bignesse answer the bignesse of the ribbes: for the bigger ribs have the bigger cartilages, and by the contrary. The ribs in the upper part are blunt, but in the under sharper. In the lower part they are grooped to receive the intercostall vessels, the veins, arteries, and nerves.

These ribs are of two sorts; for they are either long or short: the long reach to the brest-bone, and cause a circle: they are seven in number. These are articulate with the brest-bone by *arthrodia*; for in the brest-bone there are sundry cavities, which receive the cartilaginous tops of them. To the *vertebræ* they are joyned, their ends cartilaginous being received in the hollownesse of the *vertebræ*, and are strengthened by ligaments.

The short are semicircular; without, arched; within hollow. The uppermost and lowermost are shortest, but the middle longest. These

These in the forepart bend upwards, and are joyned to themselves, and the cartilages of the long ribs, if you except the twelfth. In the hinder part they are articulate and strengthened as the long; but the eleventh and twelfth stick in the *vertebrae* by one top onely. The use of the ribs is; first to be a defense to the heart and lungs; secondly, to further the motion of the brest; for they strengthen the fleshy parts.

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### CAP. XIII.

#### *Of the Brest-bone.*

THIS is not one entire bone, but is framed of three; whereof the uppermost and lowermost are alike in all ages, and but one. The second in infants is composed of three bones, which become one, the seventh yeere of the age being expired. In children all these bones are gristly, but afterward become bony:

bony : In aged persons it seemeth one bone, yet it is distinguished by three transverse lines, shewing the first division, which are more conspicuous in the inside than outside. These bones are of a red fungous substance, full of small holes : the upper part is more hard then the lower.

The upper bone is thickest and broadest ; it hath in each side a long cavity, lined with a cartilage to receive the points of the cannell bones ; betweene these is a pit called *jugulum*. The second bone is neither so thicke nor broad, yet foure times as long ; it receiveth in its cavities the cartilages of the third, fourth, fifth and sixth, ribs. The third is least of all, yet it is broader than the second, unto the lower part of which it is joyned. To the end of this is annexed the cartilage called *mucronata*, or *ensiformis*, or sword like : but the whole brest-bone compacted of three bones doth resemble the handle of a sword, which in ancient times was used,

used, being half moonlike in each side. Under this is the pit of the stomach, where the upper and left orifice of it is called *scrobiculus cordis*. The Ancients called this orifice *cor*, or heart, because the pains of it are like the pains of the heart, and called *cardialgia*.

## CAP. XIV.

*Of the vertebræ of the Loines.*

THE bones belonging to the lower belly are these; five *vertebræ os sacrum, os coccygis* and *os ischii*. The *vertebræ* of the loins are in number five; they are larger than those of the breast, because they uphold them; and the lowermost of them are biggest. They are long and semicircular: their substance is spongy, like a pumick stone, and full of holes, to give way to the veins. They have one large hole, to give way to the *spinalis medulla*; and two small, by  
the

the which nerves passe to the adjacent parts, and veins and ateries come in. As for the processes, the upper and lower differ from those of the brest: for in those the upper parts were knobby, but the lower hollow; but in these the contrary is seene; for the upper parts are hollow, and the lower knobby. The transverse are long and small. The hindermost are short and strong. In the backpart of these there is a rough hollownesse to receive *os ilium*.

### CAP. XV.

*Of the os sacrum; and rump-bone.*

It is so called from the bignesse. The Latines imitating the Greekes called things large *sacra*. This is the broadest of all the bones of the backe, and doth uphold the whole frame of the *vertebre*. In infants it is composed of five bones, most commonly united by

by a cartilage ; but in men of ripe age it seemeth but one bone. These bones are *vertebræ*, for each of them hath a body and proccesses, and hath a large hole to receive the *spinalis medulla*. In this these differ from the other *vertebræ*, because in those the lower part is bigger, but in these lesser ; wherefore the uppermost is the biggest, and the lowest the least. These have a large hole to receive the *spinalis medulla*, and other lesser framed of the union of the *fenus* to send out nerves. As for the proccesses, the oblique can hardly be discerned but in the first. The transverse are long, so united that all seeme but one. The upper part is thickest ; the hindermost are like the *spinæ* of the loynes, but lesse, and the lower the lesser ; in so much that the lowermost hath no proccess, but a round bunching out.

To the *os sacrum* the rump-bone is joyned by a cartilage : for the first bone of it hath a small hollownesse



lownesse which receiveth the last *vertebra* of *os sacrum*. It is called *os coccygis*, the Cuckoes bill, from the likenesse of it. It is framed for the most part of three bones, whereof the lower is still lesser. In men it is bent inward to stay the straight gut, and the sphincter muscle which are tyed to it; but in women outward, to give way to the matrix in the time of birth. The bones of this are spongiouse and soft, and have neither procelle nor any hollownesse. Their uniti-on with the *os sacrum*, is loose to give way to great excrements when they come out; for otherwise a luxation might be procured, as in hard labour sometimes it falleth out.

## CAP. XVI.

*Of the Hoop bone.*

**T**His bone is called *os innominatum*, or without any proper name

name by some; but by the most learned *os ischii*. I have termed it the hoope-bone, partly because it strengthneth the *os sacrum*, upon which all the *vertebræ* of the back doe rest; Partly because the motion of the inferior bones are ruled by the muscles which spring from this bone. In children it appeareth framed of three bones, joyned by a cartilage, untill the seventh yeer; but in men of ripe age these three, the cartilage being dried, seem but one entire bone. The first is called *os ilium*, the huckle-bone, because under it lyeth the small gut called *ilium*. This is the broadest, and greatest in figure, semicircular, arched without, within hollow. The semicircle is called *spina*, the arched part *dorsum*, the hollow part *caeca*. It is joyned with the *os sacrum*, and this to it, by mutuall processes and cavities. The second is called *os coxendicis*, or the hip-bone. This being placed betweene the huckle and share-bones, receiveth in its cavity the thigh bone.

T

bone. This cavity is large, and hath brimmes, and is covered with a cartilage. The third bone is *os pubis*, and *pelvis*, or the share-bone; it is seated in the fore-part, in the middle it is parted by a cartilage not very hard. These three bones, together with the *os sacrum*, make that cavity which is called *Pelvis*, which is bigger in a woman than in a man; in it are contained the guts, bladder, and part of the *matrix*, wherefore it is a shield for them. In hard labour the share-bones and the *os sacrum* will part; the cartilages and ligaments, being bedewed with superfluous humidity, giving way.

## C A P. XVII.

### *Of the shoulder-blade.*

**N**OW follow the bones of the *limmes*, which are legs and armes. The bones of the armes are either above the joynt of the shoulder, or under. Above the joynt

joynt lyeth the shoulder-blade. The substance of it is for the most part hard and solid ; the outside is somewhat arched, but the inside hollow, it seemeth triangular. It is joynted to sundry parts by *syssarcosis*, or concarnation, by meanes of the muscles. It is joynted with the nowle bone by the cucullar muscles ; to the *vertebrae* of the necke by the second paire of them ; to the back by the muscle *rhomboides*. The broad end is called *acromium* ; the other end under this, narrow and thick, is called *cervix*. Here is the anchor-like proceffe, which hindereth dislocation that way : wherefore seldome is the *adjutorium* put out forward. In the inside of this bone about the middle there is a hole, by the which a vein doth passe for nourishment of it. The shoulder-blade hath a threefold use. First, it receiveth the *adjutorium*, and maketh the articulation called *arthrodia*. The cavity of the shoulder-blade which receiveth the

*adjutorium* is shallow, that the arme might readly move every way. This hollownesse is recompensed three manner of wayes ; first, by a strong ligament, which compasseth the joynt : Secondly, by the tendons of three muscles, *supraspinatus*, *infraspinatus*, and *subscapularis*, doing the same. Thirdly, by a cartilage which cleaveth orbicularly to the ligament, but not to the hollownesse. Secondly, sundry muscles spring from the shoulderblade. Thirdly, it defendeth the back from being hurt.

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## C A P. XVIII.

### *Of the Shoulder-bone.*

**N**OW the bones of the Arme, under the joynt are three; the shoulderbone, the elbow-bones, and the bones of the hand. The shoulderbone is of a hard and solid substance: it is hollow all alongst like a whistle, wherein a marrowy

marrowy substance is contained. At the two ends it is broad, but round in the middle. In the top of it there is a long chinke through which the nervous head of the *musculus biceps* doth passe. In the lower end you shall observe the pulley, about the which the *ulna* is turned, which is in the inner knob; to the outer knob which is covered with a cartilage, the *radius* is joyned. At the sides of these are two small knobs, from whence muscles spring. About the middle of this bone in the inside, you may perceive a hole through the which a vessell doth passe to the marrowy substance for nourishment.

## C A P. XIX.

### Of the Elbow bones.

THESE are in number two; to wit, the lesser above called *radius*, and the larger below called *ulna*. Their substance is firme

and solid, if you except the additaments of them. Both of them are long, and containe a marrowy substance : they are somewhat rough, by reason of the lines appointed for the muscles.

The *ulna* is large above, lesser below : it serveth for the stretching out and bending of the arme, and so it is articulate by *gynglymos*, but the *radius* is lesser above, but longer below, to receive the bones of the wrist : it is joyned by *arthrodia*, and serveth for the turning up and downe of the hand. The *radius* above is received by the *ulna*, but below the *ulna* is received by the *radius*. They are joyned together by a long ligament, which severeth the internall muscles from the externall. The semicircular knob in the hinder part of the *ulna* is called by *Hippocrates ancon*, by *Galen olecranon*. These two bones part about the middle ; partly that the *radius* might the more easily performe its semicircular motion, partly to receive the muscles.

## CAP. XX.

*Of the bones of the Hand.*

**T**HE hand is divided into three parts: the wrist, called *carpus*; the distance between the wrist and fingers, called *metacarpus*; and the row of fingers.

The bones of the wrist are eight in number whereof there are two orders: the upper hath three bones so joyned together that they seeme one; the fourth is the least of all, and placed under the little finger. The inferior hath foure bones; they are joyned together by *harmonia*, because their motion is obscure. The upper rank is joyned with the lower part of the *ulna* by *arthrodia diarthrodes*; but the lower with the *metacarpus*, by *arthrodia synarthrodes*.

One thing is to be noted, that the annular ligament doth compass the wrist, and comprehendeth the tendons, which passe



through the cavity of the *carpus*.

*Metacarpus* hath foure bones ; they are of a solid substance , hollow & round, bigger than those of the fingers : that which answereth the pointing finger is biggest, and so still the lowermost are lesser. Between each two a distance is left for the *musculi interossei* of the fingers. Above and beneath they have an appendix ; by the upper they are joyned to the wrist, by the lower to the fingers ; the upper hath a cavity, but the lower around long top, covered with a cartilage.

In the palme of the hand there is a transverse ligament, the which doth tye the bones of the fingers to the *metacarpium*. The thumb hath no connexion with the bones of the *metacarpium*, First, because it is articulate with the wrist by *diarthrosis arthrodiastis*, and hath a manifest motion ; but the bones of the *metacarpus* are joyned to the wrist by *synarthrosis*, and have no manifest motion.

Secondly,

Secondly, because the upper of the thumb is shorter than the bones of the *metacarpium*, and not answerable to them.

As for the fingers, each of them hath three bones; each of them answering a bone of the *metacarpus*, the thumb excepted; their upper additaments have sinuosities, but the lower knobs. These bones are joyned by *gynglymus*, and so they onely stretch themselves out, and pull themselves in. As for their obliquation, it doth depend upon the *enarthrosis* of the first bone with the *metacarpus*. Besides these bones in the inside of the hand, some small bones called from their figure *sesamoides*, like the seeds of *sesamum*, or oylie pulse, or Turkey millet: they resemble the kneepan, and seeme to serve for the same use; for in strong extensions they strengthen the tendons. In the second joynt of the thumbe there are two. The second and third joynt of the forefinger have each one, the rest have two in the first joynt.

joynt. In children they are of a cartilaginous substance.

## C A P. XXI.

### *Of the Thigh-bone.*

**T**HE leg is divided into three parts, the thigh, the shank, and foot. The thigh hath but one bone: but of all others it is the biggest: the two ends of this are to be noted. In the upper part there is a round head; the slender part under it is called the neck; it is long and oblique; for if it were straight it would cause halting by pressing down the groyne. A strong ligament doth keepe in the head within the hollownesse of the *Iscium*. If this ligament be relayed or torn, it causeth halting. From the neck spring two prominences: and because the muscles called *rotatores* are fastened to them, they are called *trochantres*. the hindermost is the lesser trochanter

chanter ; but the laterall or uppermost the bigger. The lower end of the thigh-bone hath two flat and low prominences, leaving a cavity in the middle, which receiveth the *apophysis* of the *tibia*. And againe these prominences are received by the cavities of the *tibia*, by a loose *gynglymus*. The upper part of this articulation is called the knee, the hindermost the ham. Above the knee appeareth a bone, not joyned with any other bone, called the pan, or *patella* : it is somewhat round, about two inches broad, plaine without having many holes, but within bunched, covered with a cartilage. It is set before the thigh bone and the *tibia*, to strength the articulation; for otherwise the thigh-bone would slip out forward in going down any hill. It cleaveth to the knee by the thick tendons of the second, third, and fourth muscles which extend the *tibia*, and passe by the knee to it, and are implanted into the fore knob of it. Two ligaments

ligaments fasten the articulation of the thigh-bone with the *tibia*: the one is circular compassing both, the other is long, placed betweene the two bones, reddish, by reason of the veines there. Behinde there are two seed bones, tyed to the two beginnings of the first muscle which moveth the foot to strengthen them. Great wounds of the ham are mortall, by reason of the great vessels which passe that way.

## CAP. XXII.

*Of the two bones of the shank.*

THE shank is composed of two bones. The greater focill is called *tibia*, the lesser *fibula*. In the upper part it hath a proesse, which is received by the hollownesse of the thigh-bone. It hath also two long cavities for the receiving of the two prominences of the thigh-bone. To help the shallownesse

hollownesse of these cavities, there is joyned by ligaments a moveable cartilage. soft, slippery, and bedewed with an unctuous humour, which being thick, becommeth thinner towards the center: it is called *cartilago lunata*, the Moon-like cartilage. It is joyned to the thigh bone by *gynglymus*. The *fibula* onely cleaveth to the *tibia*, and toucheth not the thigh-bone. The *tibia* causeth the internall ankley. About the middle it hath a conspicuous hole to let in a veine for nourishment. This bone is triangular, having three lines; the sharpest before is called *spina*; of the posterior the inward is blunt; but the outward somewhat sharp. The *fibula* is a firme bone also, and as three square likewise, one line is before, and two behinde; the upper end hath a hollownesse covered with a cartilage in the inner side; which receiveth the laterall knob which is under the appendix in the upper end of the *tibia*, the lower end maketh the outer ankle.

## CAP. XXIII.

*Of the bones of the Tarsus.*

OF the foot as of the hands there are three parts, *tarsus*, *metatarsus*, and the toes. The *tarsus* is the distance between the lower end of the two foci, and the beginning of the five bones which are articulate with the toes: it hath seven bones; the first is *talus*, or the game bone; the great and small foci are joyned with it, and so the foot is stretched out, and drawne in, as also moved to the other side; all beasts with a cloven foot have this bone. In the upper part it is articulate with the *tibia* by *gynghmus*, and so below with the heel-bone. The second is called *cifus*, the heel-bone under the *talus*; this receiveth the great tendon called *nervus Hectorius*, composed of the tendons of three muscles of the shank. Above it receiveth the *talus*, below it is received by *sc cubiforme*.

*cubiforme*. The third is called *navicular*, from its figure ; for it is long, without bunched but within hollow, being covered with a cartilage, where it receiveth the end of *istius*. The fourth is called *cuboides* : because it hath fixe sides, representing a *cubus*. In the forepart it is joyned to the fourth and fifth bone of the *metatarsus* ; in the hinder with the heelebone ; but in the inside, it, with the rest of the sides are joyned with no bones, but are free. The three ensuing are called *cuneiformia*, or wedgelike bones ; for above they are broad, but below they are narrow ; being joyned, they represent a vault : for above they are arched, but under hollow, to receive the tendons and muscles, and not to touch the ground, for that the *cuboides* onely doth. The first of those bone is the greatest, wedgelike seated in the inside of the foot. The second is the least, placed in the middle. The third is that which is meane betweene both in bignesse. These  
three



three are joyned with the bootlike bone, or *os naviculare*.

# CAP. XXIV.

*Of the rest of the Bones of the Foot.*

**T**He *Metatarsus*, or instep, hath five bones; for one is appointed for the staying of the great toe, which is not in the hand.

They are solid without, hollow within, longer than the bones of the back of the hand. That which stayeth the thumb is thickest, the longest is that which stayeth the next toe: and although at the rest of the toes are of an equall thicknesse, yet the uppermost are longer than the lowermost: the lowermost parts are inserted into the hollowneses of the first joynts of the toes; but the uppermost ends are received by the bones of the *tarsus*. That which stayeth the thumb is received by *cuneiforme major*: the second by *cuneiforme minor*: the third by the third wedgelike bone: the other two by the two tops of *os cubiforme*.

The

The bones of the toes are in number fourteen; for the great toe hath onely two, but the rest three. These bones are solid without, and hollow within; they have three joynts, and two processes: the lowermost hath two knobs, received by the top of the lower, but the uppermost receiveth: the uppermost joynts have a deeper hollownesse, because they receive the ends of the bones of the instep. The seed-like bones are seated as they are in the hand, two are in the second joynt of the thumbe, which strengthen the tendo of the muscle which bendeth it.

CAP. VXX.

*Containing an Explication of some termes which are found in Anatomicall Authors in the Doctrine of Bones.*

**C**Otylae are termed deepe cavities in the articulation of the bones.

*Glene,*

2 *Glene*, or *glenoides* are shallow cavities.

3 *Epithysis*, or *appendix* is called a bone which groweth to the end of another bone. It is of a spongy substance, at the first gristly, but afterward becommeth bony; it may be seen in both the focils of the legs at both the ends.

4 *Apophysis*, or *tuberculum* is a part of a bone not added, but bunching out above the smooth superficies, if it be sharp, it is called *spina*.

5 *Condylus*, is a low prominence, and flat.

6 *Corone* is a sharp prominence.

7 *Supercilia*, or *labra*, are the upper brimmes of the cavities of the joynts.

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## C A P. XXVI.

*Of the number of the Bones.*

**I**N Anciēne times they were holden to be 246. according to this distich :

*Adde quater denis bis centum senaque  
babebis.*

*Quam te multiplici condidit offe  
Deus?*

But the diligence of late Ana-  
tomists hath found out more.  
Thus then they may be summed :

|   |    |
|---|----|
| The head hath                                   | 8  |
| The upper jaw                                   | 11 |
| The lower jaw                                   | 1  |
| The teeth are 32. sometimes                     | 28 |
| The <i>spina</i> hath                           | 24 |
| The <i>os sacrum</i>                            | 5  |
| The ribs are                                    | 24 |
| The breast-bone 1, but composed<br>of           | 3  |
| The Cannel-bones                                | 2  |
| The shoulder blades                             | 2  |
| Of the <i>Ischium</i>                           | 3  |
| In the armes                                    | 60 |
| In the feet                                     | 64 |
| The bones of the eares                          | 6  |
| The great seed-like bones of the<br>great toes. |    |

If with some Anatomists you  
reckon 24 seed like small bones in  
the two hands, and so many in the  
two feet, and two in each ham,  
and

and the eight bones in each hand, between the *carpus* and *metacarpium*, and the bony substance annexed to the *cuboides* in both the feet; in old persons you shall have 54 mores which being joyned to 246, make up 302. expressed thus: *Ter centum & binis compactum est ossibus istud,*  
*Quod gerimus corpus : non est quod plura requiras.*  
 If thou 302 bones chance to finde,  
 Few or none are left behinde.

## CAP. XXVII.

## Of a Cartilage.

**A** Cartilage is a similiary part, dry and hard, yet not so as a bone; flexible, which a bone is not; framed to stay the soft parts, and to repell the injuries of externall hard bodies. 1. Then it stayeth the soft parts. 2. It defendeth them. 3. They cover the ends of the bones, which have a loose articulation. 4. They knit bones together : as is seene in the sharebone.

The differences are taken first, from the figure; so the cartilage of the breastbone is called *ensiformis*, and those of the *Larynx sigmoides* like C. Secondly, some are solitary, not joyned with other bodies, as those of the eares and eye-lids: some are ioyned, as most of the rest. Thirdly, some still continue cartilages, some degenerate into bones, as in women, the cartilages of the ribs, which lye under the breasts: for these growing very big, they become bony, the better to hold them up. They are in sundry parts of the body. 1. In the head there are foure, to wit, of the eyelids, nose, and eares; and the *trachea* of the eye. 2. In the breast there be three, to wit, the cartilages of the *larynx*: the small pipes of the winde pipe, dispersed through the lungs, and *cartilago ensiformis*. 3. The long ribs are joyned to the *sternum* by cartilages. 4. The *vertebræ* of the back are joyned together by cartilages. Last of all sundry are seen in the articulations, which

which are loose, and in the conjunction of bones.

## C A P. XXVIII.

### *Of a Ligament.*

**A** Ligament is a similiary part without feeling, in substance meane, betweene a cartilage and a membrane, appointed firmly to knit the joynts.

Of the ligaments some are membranous (such are those which inviron the joynts;) some cartilaginous, as those which are betweene the joynts, as is seene in the articulation of the thigh-bone with the *coxendæx*.

Ligaments are to be found in divers parts of the body. First, the bone of the tongue hath two strong ligaments, one on each side. Besides, on each side it hath round ones by the which it is tyed to the adjacent parts, to stay it in the middle of the mouth. Secondly, the tongue hath a strong membranous ligament in the lower part about the middle of it. About the end of

it the *frænum* is to be seen, which if it come to the fore-teeth, it hindereth the motion of the tongue and speech. Children being so troubled, are said to be tongue-tyed, and must have it cut. Thirdly, the ligaments which tye the *vertebræ* of the brest and loynes, the ribs with the *vertebræ*, and the ribs with the brest bone, are membranous. Fourthly, sandry are to be seen in the belly. The first tyeth the *os ilium* to *os sacrum*: the second tyeth the *os sacrum* to the *coxendixæ*: The third joyneth the share-bones, and is cartilaginous. The fourth compasseth them circularly, and is membranous. The fifth compasseth the hole of *os pubis*, and is membranous. Fifthly, in the arme these appear. 1. Five tye the *adjutorium* to the shoulder-blade. 2. The bones of the elbow, *ulna* and *radius*, are tyed first one to another; secondly, to the shoulder-bone; and thirdly to the wrist, by membranous ligaments. 3. There are two annular ligaments, which being transverse, direct



direct the tendons which passe to the fingers, they are two; one in the outside for the tendons of the extending muscles; the other in the inner side, for the tendons of the contracting muscles. 4. The bones of the wrist, back of the hand, and fingers, have membranous ligaments. 5. In the leg these may be found out.

First, the thigh bone is tyed to the *Coxendix*, by two ligaments.

Secondly, the lower end of it is tyed to *Tibia* and *Fibula* by six ligaments.

Thirdly, the *Tibia* is joyned to the *Fibula*, by a membranous ligament.

Fourthly, *tibia* and *fibula* are, joyned to the ankley by three ligaments.

Fifthly, the ankley is tyed with the bones of the foot by five ligaments.

Sixthly, the bones of the instep and toes are tyed with such ligaments as those are which are seen in the hand.

F I N I S.



## The Contents of the first B O O K.

### Chap. 1.

**O**F the division of the parts of the  
body of Man in generall page 1

### Chap. 2.

Of the circumscription, regions, sub-  
stance, and parts of the Abdomen  
p. 5

### Chap. 3.

Of the common containing parts of the  
belly p. 10

### Chap. 4.

Of the proper containing parts p. 16

### Chap. 5.

Of the Omentum p. 19

### Chap. 6.

Of the Gula p. 24

### Chap. 7.

Of the Ventriculus, or Stomacke.  
p. 27

# The Table.

|  |        |
|--|--------|
| Chap. 8.   |        |
| <i>Of the Intestines, or Guts,</i>                                   | p. 32  |
| Chap. 9.   |        |
| <i>Of the Mesenterium,</i>   | p. 41  |
| Chap. 10.  |        |
| <i>Of the Vena Lactæe.</i>   | p. 46  |
| Chap. 11.  |        |
| <i>Of the Pancreas,</i>  | p. 50  |
| Chap. 12.  |        |
| <i>Of the Liver,</i>   | p. 52  |
| Chap. 13.  |        |
| <i>Of the Vena Portæ,</i>  | p. 59. |
| Chap. 14.  |        |
| <i>Of the Vena cava, dispersed within the<br/>trunk of the body,</i> | p. 68  |
| Chap. 15.  |        |
| <i>Of the Gall,</i>  | p. 73  |
| Chap. 16.  |        |
| <i>Of the Spleen,</i>  | p. 79  |
| Chap. 17.  |        |
| <i>Of the Kidneys,</i>   | p. 84. |
| Chap. 18.  |        |
| <i>Of the Ureters,</i>   | p. 93. |
| Chap. 19.  |        |
| <i>Of the Bladder,</i>   | p. 95. |
| Chap. 20.  |        |
| <i>Of the generation of blood,</i>                                   | p. 99. |
| Chap. 21.  |        |

## The Table.

Chap. 21.

*Of the Vasa Preparantia in Man.*  
p. 102.

Chap. 22.

*Of the Stones,* p. 105

Chap. 23.

*Of the vessels that carry the seed, and  
those that keep it,* p. 109

Chap. 24.

*Of the Uterus,* p. 113

Chap. 25.

*Of the Genitals in Woman.*

*Of the Cunnus,* p. 119

Chap. 26.

*Of the Matrix,* p. 125.

Chap. 27.

*Of the Stones, and the seminary vessels,*  
p. 132

---

## The contents of the second Book.

Chap. 1.

**O***f the common containing parts  
of it,* p. 138

Chap. 2.

*Of the Dugs,* p. 141

U 2

Chap. 3

## The Table.

### Chap. 3.

*Of the proper internall containing parts* p. 147

### Chap. 4.

*Of the trunk ascending from the Vena cava* p. 156

### Chap. 5.

*Of Vena Arterialis, and Arteria Venalis* p. 163

### Chap. 6.

*Of the great Artery, and first of the trunk ascending of the same* p. 167

### Chap 7.

*Of the descending trunk of the Aorta* p. 172

### Chap. 8.

*Of the hearts similary externall parts* p. 181

### Chap. 9.

*Of the similary internall parts* p. 186

### Chap. 10.

*Of the frame of the Lungs* p. 189

### Chap. 11.

*Of the action of the Lungs* p. 195

### Chap. 12.

*Of the Neck* p. 196

## The Table.

### The Contents of the third Book.

#### Chap. 1.

**O**F the common parts containing,  
p. 201

Chap. 2. Of the Haire, p. 203

#### Chap. 3.

Of the proper containing parts, p. 205

#### Chap. 4.

Of the nature of the Braine, p. 208

#### Chap. 5.

Of the upper region of the Braine,  
p. 210

#### Chap. 6.

Of the middle region of the Braine,  
p. 212

#### Chap 7.

Of the Cerebellum, p. 212

#### Chap. 8.

Of the Spinalis Medulla, p. 218

#### Chap. 9.

Of the action of the Brain, p. 221

#### Chap. 10.

Of the sinews proceeding from the  
braine, and first of the first paire,  
p. 228

## The Table.

|   |        |
|---|--------|
| Chap. 11.   |        |
| <i>Of the second and third paire</i>  | p. 224 |
| Chap. 12.   |        |
| <i>Of the fourth and fifth pair</i>   | p. 227 |
| Chap. 13.   |        |
| <i>Of three other paires</i>  | p. 229 |
| Chap. 14.   |        |
| <i>Of the nerves of the Spinalis Medulla;<br/>and first of the Nerves of the Neck</i> | p. 232 |
| Chap. 15.   |        |
| <i>Of the nerves of the Vertebrae of the<br/>breſt</i>                                | p. 236 |
| Chap. 16.   |        |
| <i>Of the ſinewes of the marrow of the<br/>vertebrae of the loynes</i>                | p. 238 |
| Chap. 17.   |        |
| <i>Of the nerves which come from the<br/>marrow of os ſacrum</i>                      | p. 240 |
| Chap. 18.   |        |
| <i>Showeth how the brain is to be diſſe-<br/>cted</i>                                 | p. 241 |
| Chap. 19.   |        |
| <i>Of the outward parts of the eye,</i>   | p. 242 |
| Chap. 20.   |        |
| <i>Of the tunicles of the eye,</i>  | p. 245 |
| Chap. 21.   |        |

## The Table.

|  |        |
|--|--------|
| Chap. 21.                              |        |
| <i>Of the humours of the eye</i>       | p. 247 |
| Chap. 22.                              |        |
| <i>Of the Auricula</i>                 | p. 249 |
| Chap. 23.                              |        |
| <i>Of the inward parts of the Ear</i>  | 251    |
| Chap. 24.                              |        |
| <i>Of the Nose</i>                     | p. 256 |
| Chap. 25.                              |        |
| <i>Of the Lips</i>                     | p. 259 |
| Chap. 26.                              |        |
| <i>Of the inner parts of the mouth</i> | p. 260 |

## The Contents of the fourth Book.

|   |        |
|---|--------|
| Chap. 1.                                  |        |
| <b>O</b> <i>F the Veines of the Arme,</i> | p. 264 |
| Chap. 2.                                  |        |
| <i>Of the Arteries of it</i>              | p. 267 |
| Chap. 3.                                  |        |
| <i>Of the sinews of the Arme</i>          | p. 268 |
| Chap. 4.                                  |        |
| <i>Of the veines of the Foot</i>          | p. 269 |
| Chap. 5.                                  |        |



## The Table.

|   |        |
|---|--------|
| Chap. 5.                                      |        |
| <i>Of the Arteries of the foot,</i>           | p. 271 |
| Chap. 6.                                      |        |
| <i>Of the nerves of the Foot,</i>             | p. 272 |
| Chap. 7.                                      |        |
| <i>Of the Nerves of the Spinalis Medulla,</i> | p. 274 |

## The Contents of the fifth Book.

|  |        |
|--|--------|
| Chap. 1.   |        |
| <b>T</b> HE description of a Muscle,             | p. 281 |
| Chap. 2.   |        |
| <i>Of the differences and action of Muscles,</i> | p. 287 |
| Chap. 3.   |        |
| <i>Of the Muscles of the Eyelids,</i>            | p. 291 |
| Chap 4.  |        |
| <i>Of the Muscles of the Eye,</i>                | p. 292 |
| Chap. 5.   |        |
| <i>Of the Muscles of the Nose,</i>               | p. 294 |
| Chap. 6.   |        |
| <i>Of the Muscles of the Lips,</i>               | p. 296 |
| Chap. 7.   |        |

## The Table.

### Chap. 7.

*Of the Muscles of the lower jaw,*  
p. 299

### Chap. 8.

*Of the Muscles of the Ear* p. 303

### Chap. 9.

*Of the Muscles of the Tongue* p. 305

### Chap. 10.

*Of the Muscles of the bone of the tongue*  
p. 307

### Chap. 11.

*Of the Muscles of the larynx* p. 308

### Chap. 12.

*Of the Muscles of the uvula and throat*  
p. 310

### Chap. 13.

*Of the Muscles of the head* p. 312

### Chap. 14.

*Of the Muscles of the neck* p. 314

### Chap. 15.

*Of the Muscles of the breast* p. 315

### Chap. 16.

*Of the Muscles of the loines* p. 318

### Chap. 17.

*Of the Muscles of the Abdomen,*  
p. 320

### Chap. 18.

*Of the Muscles of the genitals* p. 324

### Chap. 19.

## The Table.

|  |       |
|--|-------|
| Chap. 19. <i>Of the muscles of the bladder and Anus,</i>   | p.325 |
| Chap. 20. <i>Of the muscles of the shoulder blade,</i>     | p.326 |
| Chap. 21.<br><i>Of the muscles of the arme,</i>            | p.329 |
| Chap. 22.<br><i>Of the muscles of the ulna,</i>            | p.332 |
| Chap. 23.<br><i>Of the muscles of the Radius,</i>          | p.335 |
| Chap. 24.<br><i>Of the muscles of the wrist,</i>           | p.337 |
| Chap 25.<br><i>Of the muscles of the palm of the hand,</i> | p.338 |
| Chap. 26.<br><i>Of the muscles of the foure fingers,</i>   | p.340 |
| Chap. 27.<br><i>Of the muscles of the thumb,</i>           | p.343 |
| Chap. 28.<br><i>Of the muscles of the thigh,</i>           | p.346 |
| Chap. 29.<br><i>Of the muscles of the Leg,</i>             | p.350 |
| Chap. 30.<br><i>Of the muscles of the instep,</i>          | p.353 |
| Chap. 31.<br><i>Of the muscles of the Toes,</i>            | p.357 |
| The  |       |

## The Table.

### The Contents of the sixth BOOK.

#### Chap. 1.

**O**F the nature of a Bone, p.386.

Chap. 2. Of the naturall affe-  
ctions of Bones, p.388.

Chap. 3. Of the differences of the  
joyning of bones together, p.391

#### Chap.4.

Of the Sutures, of the head, p.394.

#### Chap.5.

Of the proper bones of the head, p.396.

#### Chap. 6.

Of the bones common to the skull and  
upper jaw, p.400

Chap.7. Of the jawes, p.403

Chap. 8. Of the Teeth, p.406

#### Chap.9.

Of the bone of the tongue, p.410

#### Chap.10.

Of the bones of the Neck, p.411.

#### Chap.11.

Of the vertebræ of the brest, p.414

Chap.12. Of the Ribs, p.415

Chap.13. Of the brestbone, p.417

#### Chap. 14.

Of the vertebræ of the Loins, p.419.

Chap.15.

## The Table.

|           |   |        |
|-----------|---|--------|
| Chap. 15. | <i>Of the os sacrum, and rump-bone,</i>                           | p. 420 |
| Chap. 16. | <i>Of the Hoop bone,</i>  | p. 422 |
| Chap. 17. | <i>Of the Shoulder-blade</i>                                      | p. 424 |
| Chap. 18. | <i>Of the Shoulder-bone,</i>                                      | p. 426 |
| Chap. 19. | <i>Of the Elbow-bones,</i>  | p. 427 |
| Chap. 20. | <i>Of the bones of the hand,</i>                                  | p. 429 |
| Chap. 21. | <i>Of the thigh-bone,</i>   | p. 432 |
| Chap. 22. | <i>Of the two bones of the<br/>shank</i>                          | p. 434 |
| Chap. 23. | <i>Of the bones of the Tarsus</i>                                 | p. 439 |
| Chap. 24. | <i>Of the rest of the bones of<br/>the foot</i>                   | p. 438 |
| Chap. 25. | <i>An Explication of some<br/>terms in the Doctrine of bones,</i> | p. 439 |
| Chap. 26. | <i>Of the number of bones,</i>                                    | p. 440 |
| Chap. 27. | <i>Of a Cartilage</i>   | p. 442 |
| Chap. 28. | <i>Of a Ligament</i>  | p. 444 |

FINIS.